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THESIS

**ANALYSIS OF TURKISH COMMUNICATIONS SECTOR
AND DETERMINATION OF CRITICAL SUCCESS
FACTORS**

by

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September 2014

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**ANALYSIS OF TURKISH COMMUNICATIONS SECTOR AND
DETERMINATION OF CRITICAL SUCCESS FACTORS**

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

Turkey is a developing country that aims at becoming a developed country within the next few decades. The information and communications sector is one of the key elements for the development of a country as communication infrastructure enables development of the economy as a whole. One unit of growth in the information and communications sector creates approximately two units of growth in the overall economy of Turkey. Thus, the information and communications sector may help Turkey reach its overall goal. This thesis seeks to answer the following research questions: Why is the Turkish information and communications sector relatively smaller than the European Union and Organization for Economic Cooperation and Development economies in terms of its GDP share? How can Turkey make its telecommunication sector more competitive in order to gain a stronger position in the global market? This study analyzes the Turkish communications sector using the PESTLE, Porter's Five Forces Model, and SWOT analysis tools. These three methods are used together as they complement each other well and provide a thorough analysis of macro and micro environmental factors. Then, based on these analyses, this thesis concludes with an examination of critical success factors for further development of the communications sector and provides performance measures for realizing these factors.

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LIST OF ACRONYMS AND ABBREVIATIONS

AKP	Justice and Development Party
ARPU	Average Revenue per User
CA	Competition Authority
CRT	cathode ray tube
EA	Enterprise Architecture
EC	European Commission
ECL	Electronic Communication Law
FATIH	Movement of Enhancing Opportunities and Improving Technology
FDI	foreign direct investment
FTTH:	Fiber to the Home
FTS	Fixed Telephony Services
GDP	gross domestic product
ICT	information and communications technology
ICTA	Information and Communication Technologies Authority
ITU	International Telecommunication Union
IoT	Internet of Things
IPR	intellectual property rights
LCD	liquid crystal display
LTE	Long Term Evolution
M2M	Machine-to-Machine
MNO	Mobile Network Operator
MTR	Mobile Termination Rate
NEET	Neither Employed nor in Education or Training
PPP	Purchasing Power Parity
OECD	Organization for Economic Cooperation and Development
OSCE	Organization for Security and Cooperation in Europe
QoS	Quality of Service
SMP	Significant Market Power
TA	Telecommunications Authority
TCMO	total cost of mobile ownership

TCP	Telecommunication Communication Presidency
TRY	Turkish lira
TT	Turkish Telekom
UN	United Nations
VMNO	Virtual Mobile Network Operator
YASED	International Investors Association

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I. INTRODUCTION

The information and communications technologies (ICT) sector has been a key element of economic growth and development and has changed our lives dramatically by giving us a much wider and more powerful range of communications means and media. Like electricity, the steam and combustion engines, electronics, automobiles, highways and railroads, information and communications technologies are general purpose technologies that contribute to the overall economy and make significant changes in our lives. Among these general purpose technologies, the ICT revolution can be compared to electricity in terms of its deep effects. Dispersion of ICT and the Internet was a great revolution that drove us into the new age, which has been variously called the Information Age, Computer Age, Digital Age, and Digital Revolution. ICT gave us tools to create and use knowledge more efficiently and effectively and produce more value with much fewer resources. Also, it changed our daily life quite considerably by creating a completely new kind of technology-related jobs and changing our traditional working methods. Only a few decades ago it would have been hard to believe that people could earn their living by working from home using the Internet. We can reach information anytime, anywhere, and the cost is affordable for common public use in most places.

The communications sector is as a subsector of ICT. If we think of information as a car on a highway, then the communication medium is the highway on which the cars travel. Fast, reliable, and affordable transfer of information anywhere at any time is the target of communication. While communications tools and media are much faster, more reliable, and diverse than they were before, there is still quite a long way to go forward. For the ICT sector and particularly for the communications subsector, consumer demand is ever-increasing. This consistently high demand for information and ICT services requires more network bandwidth availability and more investment in network infrastructure as a natural result.

Communications means and services are converging with each other through the Internet. As a result, boundaries are getting thinner among over-the-top (OTT) providers that provide their services on existing infrastructure of network operators, smartphone

producers and their growing app stores, software companies seeing growth opportunities in the communications sector for their new communications hardware products and app stores, and telecommunications companies trying to cope with the increasing competition. Besides various services such as mobile payments, video streaming, socializing, and online gaming, OTT providers can now easily provide mainstream services such as text messaging and voice communication that were under the monopoly of telecommunications companies until recent years. This convergence both offers opportunities and imposes threats for telecommunications companies. Although this convergence is a clear threat for telecommunications companies, it also creates opportunities as OTT providers increase the demand for network bandwidth usage.

In most statistics that show the ICT sector development level, Turkey is usually placed below the Organization for Economic Cooperation and Development (OECD) and European Union (EU) averages. Turkey is a developing country; thus this result is not surprising. The question is how to change this reality, catch up with OECD and EU economies, and close the gap. Member countries of EU and OECD provide a good benchmarking opportunity for Turkey in many respects. The EU acquis includes one of the most complex ICT legislations and regulations. OECD and EU collect data from their member states and publish regular reports. Most OECD reports include Turkish data. As Turkey continues negotiations on full membership with EU, most EU reports also include Turkish data. These resources provide a background for analyzing and identifying the reasons behind the fact stated in the first sentence of this paragraph.

Although the focus of this thesis is the communications sector of Turkey, understanding the communications environment requires understanding the ICT sector as a whole. Thus, the ICT sector that covers both information and communications technologies will also be examined and analyzed wherever required to understand the strong mutual interaction between these two and the effects of the IT sector on the communications sector.

A. PROBLEM STATEMENT

In comparison with OECD and EU countries, the ICT sector of Turkey is relatively smaller in terms of ICT sector size to gross domestic product (GDP) ratio. The economic size of Turkey is roughly around 1 percent of the global economy, but share of the Turkish ICT sector in global market is around 0.75 percent. For the information technologies (IT) sector, Turkey's global market share is around 0.4 percent, which is even less than half of its share in the global economy (YASED and Deloitte, 2012).

B. PURPOSE

Various studies indicate that ICT sector growth contributes to economic growth significantly. According to a recent Turkish International Investors Association (YASED) report, "One unit of ICT sector growth in Turkey leads to a 1.8 unit growth of the national economy" (YASED and Deloitte, 2012). Thus, economic growth and development level can be increased by investing more in ICT sector.

This thesis focuses on understanding the reasons behind the problem stated earlier and aims at answering how the ICT sector, and in particular the communications sector, of Turkey can be improved in order to get a larger share of the global ICT market. Furthermore, it shows opportunities for Turkey to contribute its general economic growth and competitiveness, and to decrease the difference between it and the economies of developed countries.

C. SCOPE AND LIMITATIONS

The scope of this thesis is limited to the communications sector of Turkey. However, because of the strong mutual interdependency of the IT and communications sectors, they will be examined together where required.

All data sources used in this thesis are open sources. Other sources, such as paid market analyses of financial institutions and confidential reports of companies in the communications sector, were not used as data sources.

D. RESEARCH QUESTIONS

This thesis attempts to answer these questions:

- Why is the Turkish information and communications sector relatively smaller than OECD and EU economies in terms of its GDP share?
- How can Turkey make its communications sector more competitive in order to gain a stronger position in the global market?

E. POTENTIAL BENEFITS

This study will help to understand the current state of the Turkish telecommunications sector and its position in the global market. An in-depth analysis of the Turkish telecommunications sector will be provided. Strengths and weaknesses of the sector, possible opportunities, and existing threats will be examined. Critical factors for sector success and growth will be defined. Recommendations and suggestions will be made on how to create a more competitive ICT sector and how to increase its share in the global market. A discussion for a roadmap to success will be provided.

F. ORGANIZATION OF THE THESIS

Chapter I provides a general overview of this thesis and includes the problem statement, research questions, purpose, and potential benefits of it.

Chapter II provides background information about the communications sector of Turkey. It covers sector definition, brief sector history, and a description of the business environment, major players in the sector, market size, current situation of services provided, key sector statistics, regulatory bodies, and related legal framework.

Chapter III explains the methodology used to analyze the sector and provides background for understanding the tools used in Chapter IV.

Chapter IV analyzes the communication sector of Turkey using three analyses tools: PESTLE, Porter's Five Forces Model and SWOT. These three tools complement each other well and thus they are used together. Then, critical success factors (CSF) based on these analyses are discussed. Finally, Chapter V concludes this study and identifies future work opportunities.

II. UNDERSTANDING THE COMMUNICATIONS SECTOR OF TURKEY

This chapter starts with general background about the information and communications sector. First, the sector is defined and its scope is explained. Then, a brief sector history and recent developments are presented. Later in the chapter, major sector players and their positions in the sector are examined, an overview of communications services and key statistics are presented, and their implications for Turkey are discussed. In the last part of the chapter, the related legal framework and regulations are explained, and their effects on the ICT sector are presented.

A. BACKGROUND

This section covers the definitions and brief history of the sector as well as recent developments, the business environment of Turkey, and the major players in this sector.

1. Sector Definition

According to YASED, “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.” The ICT sector includes hardware, software, IT services, communications, and telecommunications equipment subsectors. The hardware subsector includes computers, servers, hosting systems, etc.; software includes operating systems, office tools, any kind of special purpose software, etc. IT services include IT planning, design, implementation, support, training and maintenance, etc., and telecommunications equipment includes network equipment, routers, telephone devices, etc. The communications subsector includes voice access through fixed lines, xDSL and FTTx broadband, mobile voice and data communications, IPTV, etc. (YASED & Deloitte, 2012). A visual representation of this sector and its components is provided in Figure 1.

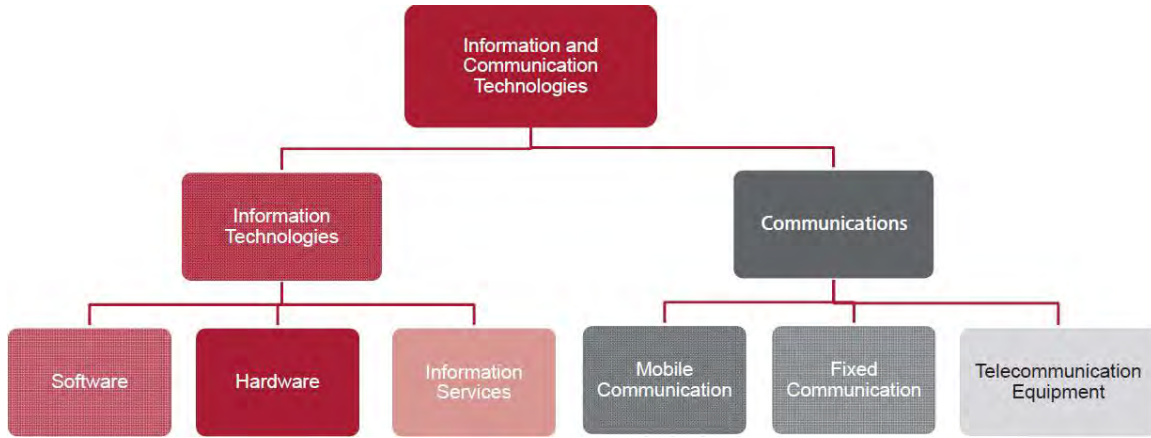


Figure 1. ICT sector and its subsectors (from YASED & Deloitte, 2012).

As shown in Figure 1, information technologies and communications technologies are two subsectors of ICT. The focus of this thesis is the communications sector. On the other hand, the information technologies subsector will also be examined and analyzed where relevant as these two sectors are largely interdependent and thus require a collective evaluation and analysis in order to comprehend the larger picture.

2. Brief History and Recent Developments in the Sector

This part discusses the history of and major developments in the Turkish communications sector history. No in-depth analysis is made, but major points that relate to further analysis of communications sector in the following chapters are provided.

a. *Brief History of Turkish Communications Sector*

In 1840, Postane-i Amirane (Ministry of Posts of Ottoman Empire) was established in Istanbul. Telegraphy services started in Ottoman Empire eleven years after the invention of telegraphy in 1854 and Directorate of Telegraph Services was established in 1855. In 1871 these two combined into Ministry of Post and Telegraph. In 1901, money transfer services started. In 1909, first manual telephony central was established in Istanbul and telephony services started. The name of the ministry was changed as Ministry of Posts, Telegraph and Telephony. After the declaration of second constitutional monarchy in 1908, the General Directorate of Posts and Telegraph founded in 1909 and linked to the Ministry of Finance. In 1911, it became a ministry again and

downgraded to general directorate in 1919 for the second time and existed as such until the collapse of Ottoman Empire in 1922. In 1939 the directorate was merged with Ministry of Transportation under the name of PTT. In 1954, status of PTT was changed as public economic enterprise. More recent history about PTT is examined in the following recent developments section (Ptt.gov.tr, 2014)

b. Recent Developments

This part is mostly adapted from the YASED report titled “Information and Communication Technologies on the Road to 2023” (YASED and Deloitte, 2012), and the “Alcatel Telecommunication Review for Third Quarter of 2004” (Evci, Ciliz, Anarim, & Sankur, 2004).

In 1924, Telegram and Telephone Law No. 406 was adopted in Turkey. This law was the main legal framework governing the electronic communications sector of Turkey until the acceptance of the Electronic Communications Law in 2008.

In 1983, Wireless Law No. 2813 was adopted and the Directorate of Wireless Communication was established as a governmental body responsible for radio frequency management.

In 1994, Law No. 4000 was adapted. This law separated post and telecommunication services. General Directorate of PTT was divided into two organizations as General Directorate of Post on one side, and Turk Telekom A.S. (TT) on the other. In following years, major provisions of this Law were cancelled by the Supreme Court.

In 1995, PTT was reorganized and Turk Telekom was established. In 1996, Law No. 4161 allowed limited privatization of Turk Telekom A.S. up to 49 percent. In 1998, Law No. 4161 was adjusted and strategic investors were given management rights.

In 2000, Law No. 4502, which defines privatization, liberalization, and regulatory frameworks, was accepted and Telecom Authority (TA), later renamed the Information and Communications Technology Association (ICTA), was established. In May 2001, Telecom Authority was given licensing authority. In 2000, General Packet Radio Service

(GPRS) service was first started by Telsim. In 2001, Turkcell was determined as the operator with significant market power by ICTA. Turkcell also started Internet services this year. Aria and Aycell started Global System for Mobile (GSM) 1800 service.

In 2003, Turk Telekom started to offer Asymmetric Digital Subscriber Line (ADSL) services. Two new entrant mobile operators Is-TIM-owned Aria and Turk Telekom-owned Aycell merged under the name of Avea. Shares of Telsim, the second largest mobile network operator, were transferred to the Savings Deposit Insurance Fund.

In 2004, the long distance telephone services market was opened to competition.

In 2005, Turk Telekom was privatized and 55 percent shares were bought by Oger Telecom. Also, Telsim was sold to Vodafone this year.

In 2008, mobile interconnection rates were discounted approximately 35 percent by ICTA, new Electronic Communication Law was adopted, mobile number portability became possible, and the local fixed-line voice market was opened to competition.

In 2009, mobile interconnection rates were further reduced by 30 percent, third-generation (3G) services started, and facility sharing became practical. In 2010, naked ADSL service was introduced. Figure 2 shows major recent developments.

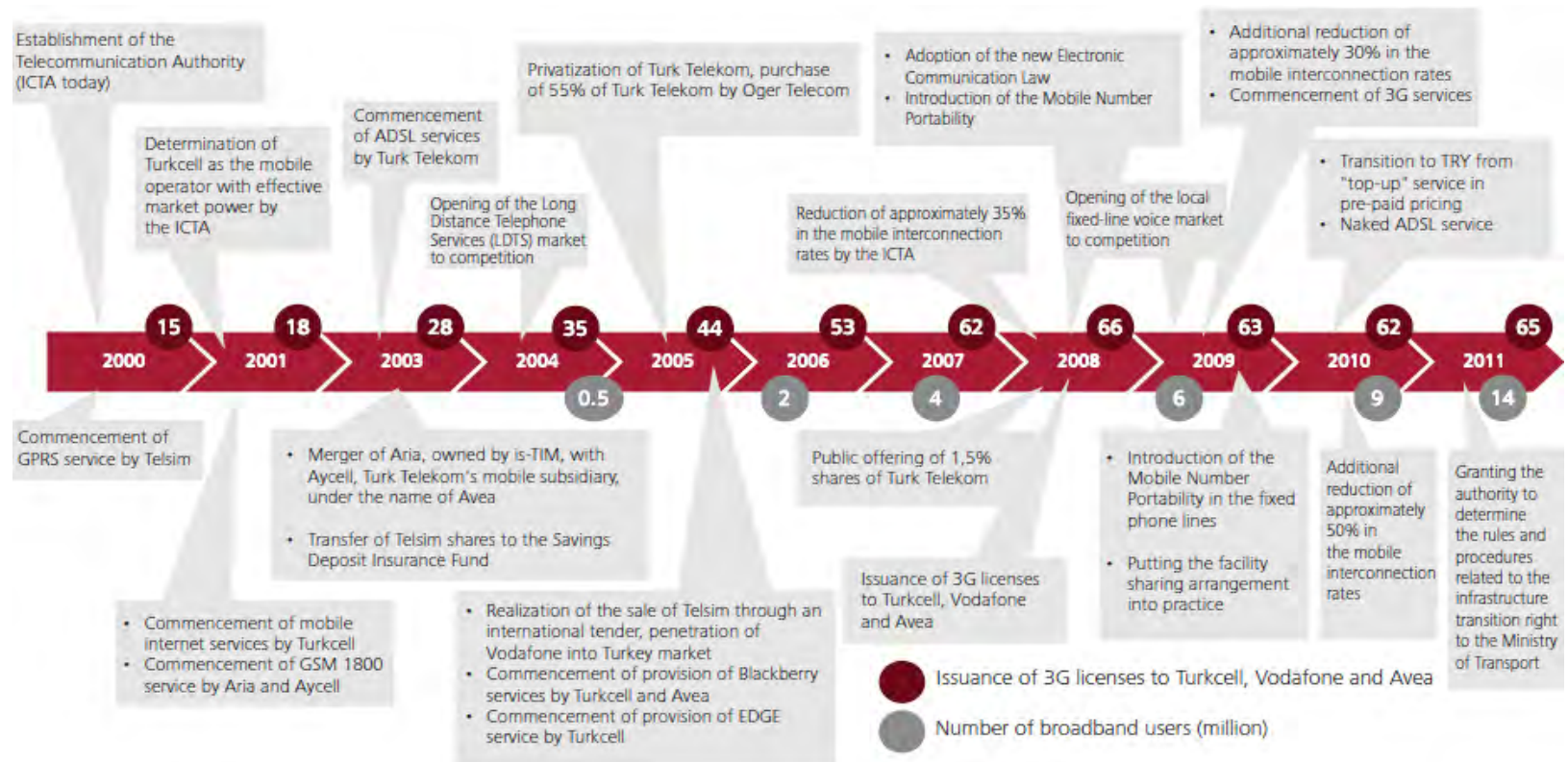


Figure 2. Major recent developments (from YASED & Deloitte, 2012).

3. General Business Environment of Turkey and Communications Sector

According to the World Economic Forum 2013–2014 Competitiveness Report, Turkey is ranked 44 out of 148 countries with a score of 4.5 on a scale of 7. For individual factors, Turkey ranks 56 in basic requirements such as institutions, infrastructure, macroeconomic environment, health and primary education; 45 in efficiency enhancers that include higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, and market size; and 47 in innovation and business sophistication. In the same report, a stage 2 economy is described as an efficiency-driven economy and a stage 3 economy is an innovation-driven economy. In stage 2, countries produce by using more efficient processes and they try to increase quality of the product. Competitiveness is driven by higher education, efficient goods and labor markets, developed financial markets, benefits derived from existing technologies, and a large domestic or foreign market. Stage 3 economies are innovation driven economies. Wages are quite high in these economies and thus it is only possible to keep the living standard by producing innovative and sophisticated production methods (Schwab, 2013).

In this report, the economic development level of Turkey is stated as a transition economy moving from stage 2 to stage 3. Figure 3 shows the economic development level of Turkey as described in the World Economic Forum's report. According to the same report, the most problematic factors for doing business are high tax rates, a poorly educated workforce, an inefficient bureaucracy, financing problems, tax regulations, infrastructure insufficiency, lack of innovation, and corruption (Schwab, 2013). In comparison with other countries in transition between stage 2 and 3, one of the strong points of the Turkish business environment is large market size.

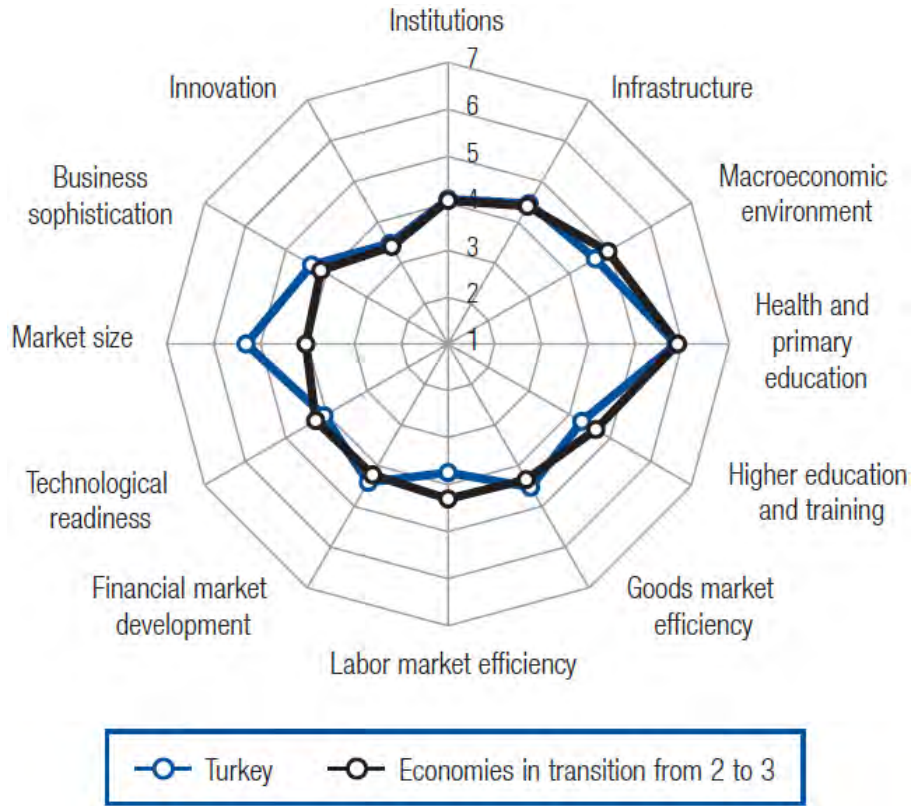


Figure 3. Development level of the Turkish economy (from Schwab, 2013).

Among the problems stated previously, high tax rates, a poorly educated workforce, and lack of innovation can be considered as the most important ones for the communications sector. Tax rates applied in the communications sector, particularly in mobile communications, are among the highest in the world and a limiting factor for sector growth. The poorly educated workforce and lack of innovation are two major problems for sector progress and they require improvement in the education system. Further analysis will be made in Chapter IV of this study.

4. Major Players in Communications Sector and Foreign Investors

There are currently three mobile network operators in the mobile market: Turkcell, Vodafone, and Avea. In terms of number of mobile subscribers, Turkcell holds 51.9 percent, Vodafone holds 28.2 percent, and Avea holds 19.9 percent of the mobile market. For the fixed line telephony and fixed line broadband Internet markets, Turk

Telekom is the dominant player. In this section, these major companies are discussed briefly as they have significant effects on the communications sector.

a. Turk Telekom

Turk Telekom separated from PTT in 1995 and was owned by state at that time. In 2005, it was privatized and Oger Telecom bought 55 percent of the shares. Thirty percent of the shares belong to the Turkish Treasury and 15 percent of the shares are open to the public and traded on the Istanbul Stock Exchange. Among others, Turk Telekom group subsidiaries include incumbent fixed line operator Turk Telekom, the third largest mobile network operator Avea, the largest Internet service provider company TTNET, the information solutions and technology company INNOVA, the customer services and call center company ASSISTT, the telecommunications solutions company ARGELA, and the online educational content developer and service provider company Sebit (Türk Telekomünikasyon A.Ş., 2014). Turk Telekom is the dominant player in fixed line telephony and broadband Internet markets. For mobile market, it is the third largest player through its subsidiary Avea.

As of 2014, Turk Telekom Group has created 45 percent of total revenues in Turkish telecommunications market. 28 percent of these revenues come from broadband, 30 percent from mobile, 24 percent from fixed voice, 9 percent from corporate data business and 9 percent from other services (Türk Telekomünikasyon A.Ş., 2014).

b. Turkcell

Turkcell was founded in 1993 and started its operations in February 1994. In April 27, 1998, it signed a GSM license contract with the Ministry of Transportation for 25 years and became the first entrant in the mobile communications market. Turkcell has subsidiaries in Ukraine, Belarus, Germany, Turkish Republic of North Cyprus, Kazakhstan, Azerbaijan, Georgia, and Moldova. Turkcell is the dominant player in the mobile telecommunications market with a share of 52 percent of all mobile subscribers as of December 2012. Also, Turkcell provides fixed line broadband Internet services through its subsidiary Superonline and competes with Turk Telekom subsidiary TTNET (Turkcell İletişim Hizmetleri Anonim Şirketi [Turkcell], 2013).

The shareholder structure of Turkcell is complicated and disputed. Currently, ownership of Turkcell shares is as follows: Turkcell Holding A.Ş. has 51 percent, Çukurova Holding A.Ş. has 0.05 percent, Sonera Holding B.V. has 13.07 percent, and 35.88 percent of shares are publicly traded. On the other hand, Sonera Holding B.V. has 47.09 percent of Turkcell Holding A.Ş. and Çukurova Holding A.Ş. has 52.9 percent of Turkcell Holding A.Ş. shares. Thus, Sweden-based Scandinavian telecommunication operator TeliaSonera owns approximately 37 percent of Turkcell shares, a Russian investment company Alfa Group holds 13 percent, Turkish Çukurova Holding A.Ş. owns 14 percent, and 36 percent of the shares are publicly traded on the Istanbul Stock Exchange. Figure 4 shows this complicated structure (*The Economist*, 2012).

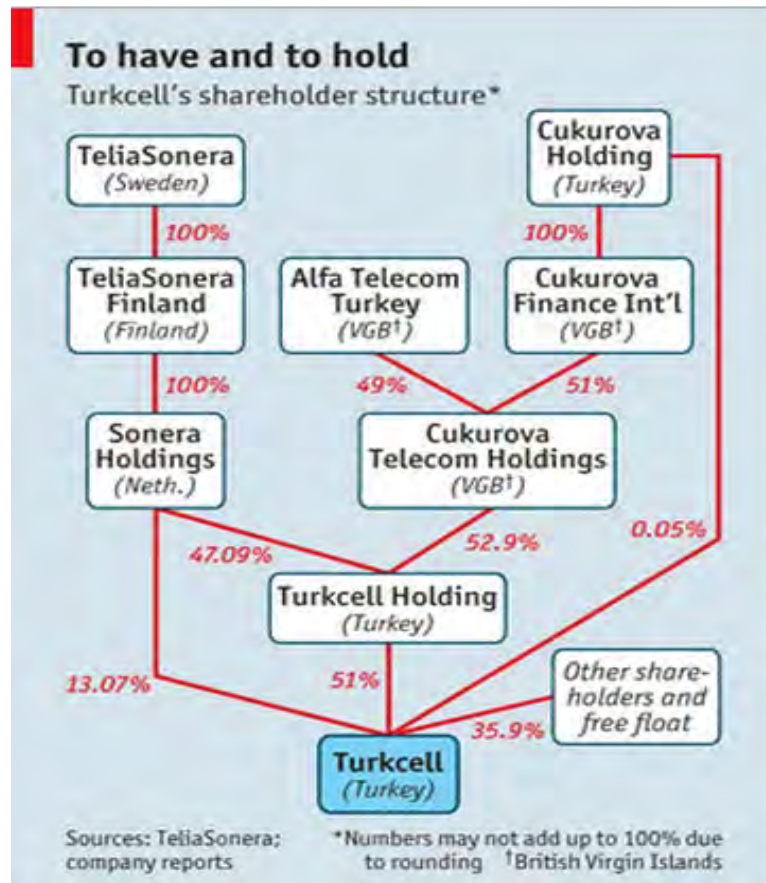


Figure 4. Ownership structure of Turkcell (from *The Economist*, 2012).

According to this structure, shares of Turkcell are distributed as follows: TeliaSonera: 37.1 percent, Alfa Telecom: 13.1 percent, Çukurova Holding A.Ş.: 13.9 percent, and Publicly Traded Shares: 35.9 percent (the first decimal number is rounded up). Currently, there are ongoing conflicts and legal problems among shareholders about ownership of shares. Because of these conflicts and resulting court cases that are still not resolved, the company board of directors cannot operate normally, which affects governance and management of Turkcell. Political problems in Ukraine and Belarus are other concerns for Turkcell as it has significant investments in these countries. On the other hand, strong position, cash generation, and cash balances are strengths of Turkcell (Standard & Poor's, 2013).

c. Vodafone

Telsim entered into the mobile communications market in 1994 and became the second entrant to the mobile market and second largest mobile network operator in Turkey. Vodafone bought Telsim on December 28, 2005, and changed its name to Vodafone in May 2006. As of 2014, Vodafone is one of the largest telecommunications companies in the world in terms of revenue and operates in over 30 countries. Vodafone is the second largest mobile network operator in Turkey.

d. Avea

Turk Telekom-owned Aycell and İş-TİM-owned ARIA, resulted in TT&TİM İletişim Hizmetleri A.Ş., or TT&TİM Communications Services Inc., which was officially founded on February 19, 2004. Then this name was changed to “Avea” on October 15, 2004. In November 2005, as a result of privatization of Turk Telekom, one of the main shareholders of Avea, Oger Telecom, acquired 55 percent of Turk Telekom. In September 2006, Turk Telekom bought shares of Telecom Italia. As a result of all these mergers and acquisitions, Turk Telekom owns 90 percent and İş Bank Group owns 10 percent of Avea (Avea, 2012).

Avea is the smallest one of the three currently existing mobile market players. Among other factors, the main reason for this fact is simply market entry dates. Turkcell

entered into the market in 1994, followed by Telsim in the same year, and Aria and Aycell, which merged into Avea, in 2001.

e. Foreign Investors

As explained earlier, all major players in the Turkish telecommunications market are completely or partially owned by foreign investors. Saudi Oger Telecom owns 55 percent of Turk Telekom and 55 percent of TTNET, and controls 49.49 percent shares of Avea as 89.99 percent of Avea is owned by Turk Telekom. Vodafone Turkey is totally owned by Vodafone. The Nordic telecommunications company TeliaSonera has 38 percent of Turkcell shares and Russian Alfa Telecom owns 13 percent. Foreign investments are very desirable for economic growth, but may also result in profit transfer abroad in the long run. Also, telecommunications is a strategic sector for a country. Thus, having too much foreign investment share in major players may have negative consequences in the long run if it is not regulated and managed effectively.

B. MARKET SIZE AND KEY STATISTICS

Turkey is ranked as seventeenth largest economy of the world with a GDP around \$800 billion. As shown in Figure 3, which depicts the development level of the Turkish economy, market size is one of the relatively stronger aspects. While the economy of Turkey comprises around 1 percent of the world economy, share of the ICT sector of Turkey is around 0.75 percent. This indicates a potential for growth in this sector. As of 2011, total size of the ICT sector is \$30 billion. Share of the communications subsector is 71 percent and share of the IT subsector is 29 percent. This means the size of the communications subsector that includes mobile communications, fixed communications, and telecommunication equipment is around \$21 billion, and the size of IT subsector that includes software, hardware, and information services is \$9 billion. On the other hand, information services accounts for 21 percent of the world ICT sector, but this share is only 4 percent in Turkey. Similarly, while software has a share of 9 percent in the world ICT sector, share size of software in the Turkish ICT sector is 3 percent. While the total of the IT subsector accounts for only 29 percent in the Turkish ICT sector, the same subsector accounts for 42 percent of the world ICT sector (YASED & Deloitte, 2012). As

another benchmark, while communications market size of the EU-27 average is 3 percent, for Turkey the communications market size is around 2 percent of GDP (Cullen International, 2013a). These modest statistics indicate that there is still room for future growth in the Turkish ICT sector, in both the communications and information technology subsectors.

1. Fixed Voice Telephony Market

The fixed voice telephony market includes Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), and Voice over Internet Protocol (VoIP). In terms of revenue, the size of the fixed voice telephony market is approximately \$3.5 billion as of 2011 (Cullen International, 2013a). In Turkey the fixed voice telephony market size has shrunk in the last decade because of mobile substitution of fixed lines. While fixed telephony penetration rate was 26.7 percent in 2003, it declined to 18.3 percent in 2012. The current number of subscribers is 13.86 million. This indicates 68 percent population coverage rate as average household size is 3.76 in Turkey (Information and Communication Technologies Authority, 2012) The fixed size market shrinkage trend is also valid for EU and OECD countries.

As of December 2012, Turk Telekom is the incumbent operator in the fixed telephony market with a market share of 86.9 percent and FTS (Fixed Telephony Services) operators have 13.1 percent of the total fixed telephony market in terms of revenue. The same rates were 93.6 percent versus 6.4 percent respectively in 2007 and changed gradually since then in favor of FTS operators. Particularly, international traffic shares have changed significantly in favor of FTS operators in terms of volume because of the price advantage offered by FTS operators. While the FTS operators' share in international calls increased from 15.7 percent in 2007 and to 39.9 percent in 2012, the share of Turk Telekom decreased from 84.3 percent to 60.1 percent within the same period of time (Information and Communication Technologies Authority [ICTA], 2012). All these developments indicate increasing competition in the fixed voice telephony market in Turkey. On the other hand, Turk Telekom is still the incumbent market

operator and holds quite a large portion of the fixed voice telephony market, which prevents competition to a degree.

ARPU (Average revenue per user) is an important indicator for profitability of network operators. Fixed voice ARPU for Turk Telekom has gone downward since 2005 and now it is currently stable around \$10. This is quite low in comparison with EU and OED countries. Turkey has the lowest revenue per communication access path among OECD countries and fixed lines are no exception (OECD, 2013a).

2. Internet and Broadband Market

As of December 2012, the total number of Internet subscribers in Turkey has reached to 20.1 million. The total number of subscribers of DSL (Digital Subscriber Line) technologies is 6.6 million and the number of mobile broadband services subscribers is 12.16 million (ICTA, 2012). According to December 2013 OECD broadband statistics, penetration rate for DSL is 8.9 percent, for cable 0.6 percent, for fiber 1.6 percent, and for other types 0.1 percent in Turkey. The total average fixed broadband penetration rate in Turkey is 11.2 percent and total number of all fixed broadband subscribers is around 8.3 million. The same statistics for OECD countries is as follows: 13.9 percent DSL, 8.4 percent cable, 4.5 percent fiber, and 0.2 percent other. The total average fixed broadband penetration rate for OECD countries is 27 percent (OECD, 2013b).

The Internet penetration rate in Turkey is the lowest among OECD countries in terms of fixed broadband and second lowest in terms of total broadband penetration rate, which includes mobile and fixed broadband penetration rates. Also, it is noteworthy that there is a significant difference in technologies used. While subscribers in Turkey mostly use DSL, OECD subscribers use cable and fiber technologies besides DSL. Particularly, the fiber penetration rate is far below OECD average fiber penetration rate. Thus, in 2011 ICTA excluded fiber networks from market analysis for a period of five years or fiber penetration rate increases up to 25 percent in the total broadband market (Cullen International, 2013b). Low broadband penetration profile indicates a weakness. On the other hand, this shows that there is still room for high growth in broadband market.

Although the competition has significantly improved in recent years, one of the problems in the fixed broadband market is high share of the incumbent operator, resulting in low competition and slow development of broadband market. As of 2012, Turk Telekom subsidiary TTNET holds 73.6 percent of the market. This rate was 95.9 percent in 2006 and has decreased steadily since then. According to the author, another important factor for relatively low penetration rate is the low education profile of the population. With the increase in education level, the people's demand for Internet and the penetration rate increases. Another reason is high fixed broadband price in terms of GDP. While Turkey has a relatively low GDP, fixed broadband prices are higher than OECD average. Fixed broadband prices are particularly expensive for high access rates, which is among the reasons for the quite low fiber penetration rate in Turkey.

3. Mobile Market

The mobile market constitutes 30 percent of the total ICT sector, which means that its size is around \$9 billion (YASED & Deloitte, 2012). As of 2012, the number of mobile subscribers is around 68 million, which means that the mobile penetration rate is around 90 percent. On the other hand, the average mobile penetration rate is 109 percent for OECD and 135 percent for EU. While the mobile penetration rate is relatively low, the share of prepaid customers is 62 percent, the third highest prepaid rate among EU countries. Share of postpaid customers is 32 percent (Cullen International, 2013a; OECD, 2013a). Thus, it can be said that the mobile market has still room for future growth as mobile penetration rate is low. High prepaid rate in overall mobile market can be construed as customers trying to use discounted rates through different networks. Turkey has a young population and the number of students in the total population is quite high. Most prepaid offers addressing students and other population groups typically offer cheap rates in the same network and higher rates for other networks. Thus, having prepaid subscriptions from multiple carriers may result in high rate of prepaid subscribers in total mobile market. Prepaid subscriptions usually generate lower revenue per subscriber and thus result in lower average revenue per user (ARPU) for network operators.

The mobile market is shared by three network operators. As of 2012, market shares of Turkcell, Vodafone, and Avea are around 52 percent, 28 percent, and 20 percent, respectively (Cullen International, 2013a). Current ARPU for mobile operators is around \$10. This is quite low in comparison with EU and OECD countries. As previously stated, in the fixed market ARPU is an important factor affecting profitability of network operators. The main reason for low ARPU is high tax rates applied on mobile communications. In Turkey, the portion of taxes within the total cost of mobile ownership (TCMO) is 48.23 percent, which is by far the highest in the world. Besides a Value Added Tax (VAT), Turkey also imposes an airtime excise of 25 percent on mobile communications (Deloitte, 2011). Elimination of this airtime excise would decrease TCMO by 30 percent and decrease its share in GDP from 7.7 percent to 5.4 percent (Deloitte, 2012). Communications taxes, and mobile communications taxes in particular, are quite high and their effects will be discussed later in Chapter IV of this study.

C. LEGAL FRAMEWORK

Until the adoption of Electronic Communication Law No.5809 (ECL) on November 2008, the governing law in the telecommunications industry was Law No.406, dated 1924. Although amended many times after the opening of the communications industry to competition and abolition of monopoly, Law No.406 was too old to meet the needs of the communications sector. Furthermore, Chapter 10 of EU acquis, which is the Information Society and Media chapter, required harmonization with the EU electronic communications legal framework. Thus, a new electronic communications law was accepted in 2008. ECL aims at harmonizing regulatory framework with EU acquis on the electronic communications sector. For a definition of terms, ECL takes into consideration two sources: European legislation and International Telecommunication Union (ITU) and definitions of some terms are adapted from these sources (Işık, Karaduman, & Yavuzdoğan, 2009).

Core topics covered by ECL law are “service quality, cost accounting, facility sharing, access tariffs, rights of use, accounting separation, access and interconnection, operator change, numbering, spectrum management, consumer and end user rights, and carrier selection” (Türk Telekom Group, 2014).

1. Regulatory Bodies

The Ministry of Transportation, Maritime Affairs and Communications, the Information and Communications Authority, and the Competency Authority are regulatory bodies that regulate information and communications sector of Turkey.

a. Ministry of Transportation, Maritime Affairs and Communications

Article 5 of Turkish ECL of 2008 lists the competencies of Ministry. These are, mainly, as follows:

- Determination of strategies and policies regarding electronic communications services based on scarce resources such as numbering, Internet domain names, satellite position and frequency allotment.
- Determination of objectives, principles and policies towards the aim of encouraging the development of electronic communications sector in free competitive market.
- Determination of policies towards construction and development of electronic communications infrastructure, network and services.
- Contribution to development of electronic communications equipment industry and taking measures to increase domestic production.
- Taking necessary measures to ensure the continuity of electronic communications in the case of natural disasters and extraordinary situations.
- Promotion and support for domestic design and production of electronic communications systems, promotion of research, development and training activities relating to the sector (Electronic Communications Law, 2008) (Article 5).

The approach in this article is harmonious with the main liberalization principle for network markets that ministry is responsible for general formation of policy and an independent authority is responsible for the performing of regulations (Atiyas, 2011). The competencies of the independent regulatory authority of Turkey, ICTA, are described here.

b. Information and Communications Authority – ICTA

In 2000, Law No. 4502, which was inspired by the 1998 regulatory framework for electronic communications of the EU, was accepted. In accordance with Law No. 4502, the Telecommunication Authority (TA) was established on January 2000 and it was renamed as the Information and Communications Technologies Authority with the entry into force of the Electronic Communications Law, ECL, in 2008. ECL made the regulatory framework much more harmonious with the 2002 EU regulatory framework (Atiyas, 2011). Among others, the main responsibilities of ICTA are (Electronic Communications Law of Turkey [ECL], 2008, Article 5):

- establishment and maintenance of competition in the market
- granting authorizations and licenses
- monitoring and supervision of the market
- allocation and planning of frequencies, satellite positions, and numbering
- analysis of market and determination of operators with significant market power (SMP)

Market analysis is made by ICTA once in every three years and operators with SMP position in an electronic communications market are determined. Market analysis is made in accordance with the February 2003 European Commission recommendation and a three criteria test is used (Cullen International, 2013b). These criteria are the presence of high and non-transitory entry barriers into the market, lack of tendency towards effective competition within a foreseeable period of time, and the inadequacy of competition law in addressing the market failures (Knieps, 2010).

Some conclusions can be made about competencies of the ICTA in 2008 ECL. First, the determination of operators with SMP by market analysis is clearly stated, but obligations and market analyses are weakly related and the obligations may be different for different operators with SMP (Atiyas, 2011). This observation is based on Article 7(3) of ECL:

The Authority may identify the operators with significant market power in the relevant markets as a result of conducting market analyses. The Authority may also impose obligations on operators with significant market power with the aim of ensuring and promoting an effective competition environment. Differentiating may be performed among the operators with significant market power in the same and/or different markets, in terms of the obligations in question. (ECL, 2008, Article 7)

Secondly, ICTA has to publish its decisions together with its justifications. This requirement is quite important for the accountability and transparency of ICTA. Besides similarities, there are also points in 2008 ECL on the authorities of ICTA that are different from EU regulations. As an example, while EU framework limits imposing carrier selection and carrier pre-selection to operators with SMPs, but there is no such limitation in ECL and these can be imposed on all operators (Atiyas, 2011).

c. Competition Authority

The Competition Authority of Turkey was founded on December 7, 1994, based on Article 20 of the Law No. 4054. The impact of the European Union played a key role in the establishment of regulatory agencies, but also impacts of the International Monetary Fund, the World Trade Organization, and the OECD were important in regulatory reforms. The EU made establishment of a competition authority a precondition for the Customs Union Agreement in 1996 (Ozel, 2013). The basic mission of the Competition Authority is ensuring a healthy and free competition environment for the creation and growth of markets for goods and services. Thus, the Competition Authority uses its legal authority in order to prevent any obstacle to a competitive environment in the goods and services markets (Türk Telekom Group, 2014).

2. Related Laws and Regulations

This part provides background to understand the legal framework regulating the information and communications sector by examining the most significant laws that govern the sector. Not all laws are covered and examined for the purpose of this thesis.

a. Universal Service

Universal service is defined as “the provision of a baseline level of telecommunication services to every resident of a country at a reasonable charge” (Parsons, 2010) or “minimum set of services of specified quality to which all end-users have access, at an affordable price in the light of specific national conditions, without distorting competition” (European Commission, 2002). Over time, the scope of universal service expanded to include fixed connection to public network, fixed Internet access, public payphones, and special services for disabled people (Cullen International, 2013b).

Article 2 of Law No.5369, the Universal Service Law that was adopted in 2005, defines universal service as “the electronic communications services, including access to Internet, which is accessible to anyone within the territory of Republic of Turkey regardless of the geographical position, and which is to be offered with a predefined level of quality and minimum standards in return for reasonable prices affordable to anybody” (Law on Provision of Universal Service and amendments to certain laws No.5369, 2005). According to Article 5 of the same law, universal service includes fixed telephony, payphone, telephone directory, emergency calls, basic Internet, and maritime passenger transportation services.

With the convergence of communication services, the expansion of the scope of universal service to include broadband is getting more important. Universal service legislation should be expanded to include broadband access (Oğuz, 2013). According to amended Universal Service Directive, functional Internet access should be covered within the scope of universal service. Thus, minimum data rates should be determined by member states to ensure Internet functionality. Currently, no minimum data rate for functional Internet access is defined in Turkey (Cullen International, 2013b).

With the entry into force of the 2005 Universal Service Law, collection of universal service incomes started. According to this law, there is no independent fund for collecting universal service revenues. The Ministry controls these revenues and most goes to the Treasury. The remaining part is used for various goals that do not relate to universal services. Usage of universal services revenues for general public services results in inefficiencies and loss of welfare (Oğuz, 2013). On the other hand, disparity between taxes applied on fixed and mobile telephony services and too high tax rates applied on the telecommunications industry, which is literally highest in the world, decreases usage of mobile services and limits universal service. A decrease of taxes applied on the telecommunications sector can be compensated for by a general positive effect (Oğuz, 2013).

In line with the EU Universal Service Directive and Turkish Universal Service Law, the affordable telephony directory and emergency call services requirement is met. Affordable telephony directory services are available, and emergency calls are free in Turkey (Cullen International, 2013b).

b. Internet Freedom

Freedom of expression and respect for privacy and family are under constitutional guarantee in Turkey. Law No. 5651 allows blocking access to specific websites because of the following crimes: encouragement for committing suicide, sexual abuse of children, facilitating the usage drugs, provision of substances that are dangerous to health, pornography, gambling, and crimes against Atatürk. Also, ICTA is administratively authorized to block access to specific websites. The problem with the law is proportionality. Large content providers might be blocked as a result of single infringement in their content. Well-known examples of blocking websites include YouTube, DailyMotion, Google, and more recently Twitter which were temporarily banned for their content. As a result, the law is exposed to public criticism (Cullen International, 2013b). Considering the large number of websites banned and that these websites also include large content providers, it seems that law is open to political, administrative, and sometimes even personal arbitrariness to some extent. A 2012

progress report for Turkey proposes to revise this law saying that frequent bans cause concern (European Commission, 2012).

Because of these restrictions, the level of Internet freedom is partially free or selectively free. Although there are limitations to certain websites from time to time, the author thinks that this is mostly not because of the laws themselves, but the way people authorized to implement these laws interpret them which causes concerns. It is clear that access to large content providers should not be blocked because of a single infringement of law. Laws will be revised and the mindset of people implementing these laws will change in line with the improvements in democratic maturity level in time.

c. Lawful Interception

According to Turkish Law, lawful interception is limited to serious crimes and requires court order. The legality of the interception is examined by the Telecommunication Communication Presidency. The legal framework for lawful interception for national security/public security exists but the legal framework for lawful interception for defense/military purposes does not. Intercepted persons do not need to be informed and cannot appeal (Cullen International, 2013b).

3. Evaluation of Legal Framework

This section evaluates the legal framework for information and communications sector by indicating potential authority conflicts, discussing harmonization with EU acquis, and comparing with international best practices.

a. Potential Authority Conflicts between ICTA and Competition Authority

According to Article 6(b) of the ECL Law, ICTA is authorized to inspect breaches of ECL, or breaches of regulations based on ECL, and impose enforcements against those breaches, and thus it limits the authority of ICTA within the scope of this law in terms of competition breaches. The same article also states that “ICTA should take the opinion of Competition Authority for the breach of competition in electronic communications sector if specified by the legislation.” There is no statement preventing the Competition Authority from taking action in situations where there is a breach of both competition law

and ECL at the same time. On the other hand, in practice the Competition Authority has not taken action for a breach of competition that falls within the scope of authorization of ICTA so far. Thus, ECL does not have a distinct division of authorizations between the ICTA and Competition Authority in terms of competition. Examples of disputes over competencies of the two agencies are seen in cases of low cooperation (Atiyas, 2011).

b. Harmonization with EU Acquis

Turkey is aligning its ICT legislation with the EU and the current 2008 ECL is mostly based on the 2003 EU Electronic Communications Regulatory Framework. ECL made competencies of authorities clearer. On the other hand, according to the European Commission, primary law and the regulations for their implementation could be more harmonious. Currently, Turkish laws are not harmonious with EU 2009 regulatory framework yet (EBRD, 2012a). While electronic signature law is adopted in line with EU Directive 1999/93/EC, there is currently no law for data protection, and cybercrimes are covered by Criminal Code provisions. Legislation for electronic communications are complicated and dispersed across various laws. Also, there is no supervision authority for data protection and electronic commerce yet (Cullen International, 2013b). Particular focus areas for further alignment with EU acquis are independence of national regulation authority, and regulatory measures that support faster development of broadband Internet infrastructure and services (EBRD, 2012a).

Although not perfect and not fully harmonious with EU framework, Turkey's primary legislation on electronic communications provides a consistent framework for establishing measures required for liberalization of the telecommunications market. After the adoption of ECL, ICTA has made significant changes in secondary legislation and secondary legislation is also usually consistent with its EU equivalents. As a result, differences between EU and Turkey legislation on electronic communications are getting narrower. Thus, the reason for slow competition development in the future may be poor implementation of legislation rather than adoption of it (Atiyas, 2011).

c. Evaluation of Legal Framework Quality

Communications sector legislation of Turkey is governed by complicated primary laws, and secondary laws and regulations depending on these laws. ECL law adopted in 2008 is the main governing law on the electronic communications sector. The ECL is not a very comprehensive law and some other significant issues are covered by secondary laws. Thus, it is possible to see overlapping provisions across various regulations. Turkish legislation is mostly harmonious with the EU 2003 framework in terms of interconnection and infrastructure access, market analysis and enforcement, numbering, customer protection, regulator independence and structure, and universal service and spectrum management. While the EU 2009 framework is not adopted yet, regulations adopted after 2009 partly implement some requirement of this framework (EBRD, 2012a).

Figure 5 shows the quality of telecommunications sector legal framework in Turkey. The shaded area represents the average performance of countries consisting of Albania, Bosnia and Herzegovina, Croatia, FYR (Former Yugoslavian Republic of) Macedonia, Serbia, and Turkey. The extremities of the chart represent international best practices, and Turkey is represented with a solid line in the chart.

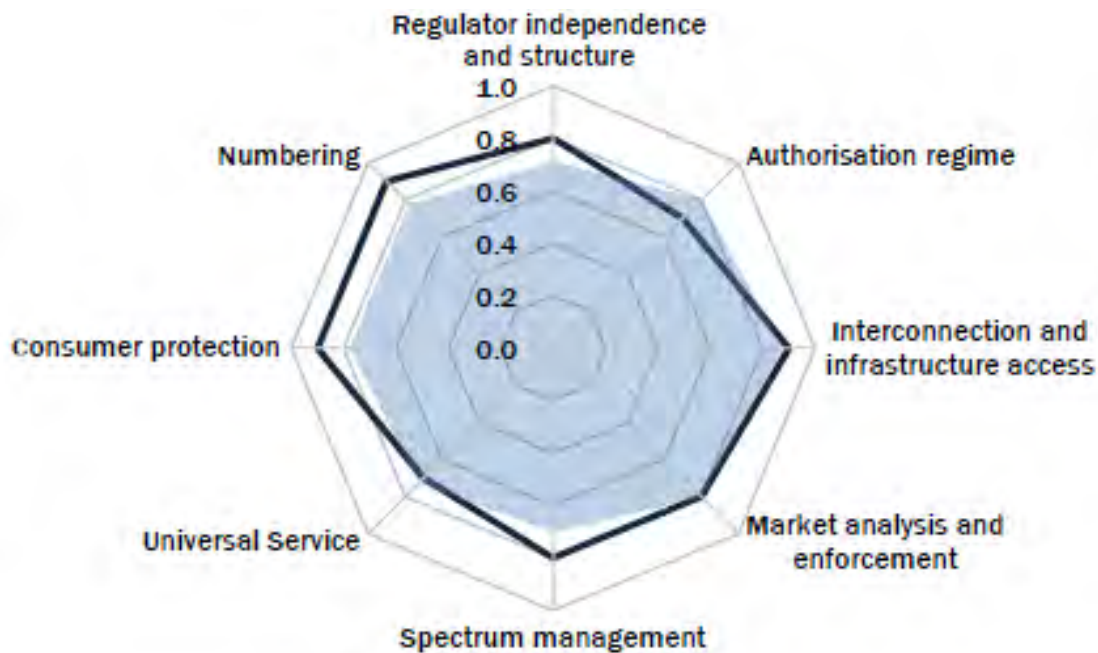


Figure 5. Quality of the telecommunications legal framework in Turkey (from EBRD, 2012a).

In terms of market analysis and enforcement, ICTA is authorized to implement adequate enforcement without court decisions. Although ICTA is an independent authority, it is “associated with the Ministry of Transport” according to Law 2813, and in terms of budgeting, there are some deficiencies. As a result Turkey is below the regional average with regard to authorization regime. For spectrum management, Turkey is above the regional average as it has sufficient provisions for management of spectra. On the other hand, Ministry can imitate tenders for spectrum which creates uncertainty about who will initiate tenders. Moreover, the ICTA is free to announce frequency allocation tenders openly and may decide to conduct tenders among specific tenderers. Thus, transparency can become a concern under some circumstances (EBRD, 2012a).

Figure 6 shows overall regulatory risk for the telecommunications sector in Turkey. In this figure, the legal framework discussed previously is one of the dimensions. Sector organization and governance, market conditions for wired and wireless services, fees and taxation, and information society progress are other dimensions included in assessing overall regulatory risk. Shaded area represents the regional average as

explained earlier in Figure 5 and outer extremities represent international best practices. The overall legal risk of Turkey is 69 out of 100, where 100 represents the lowest risk in this measure.

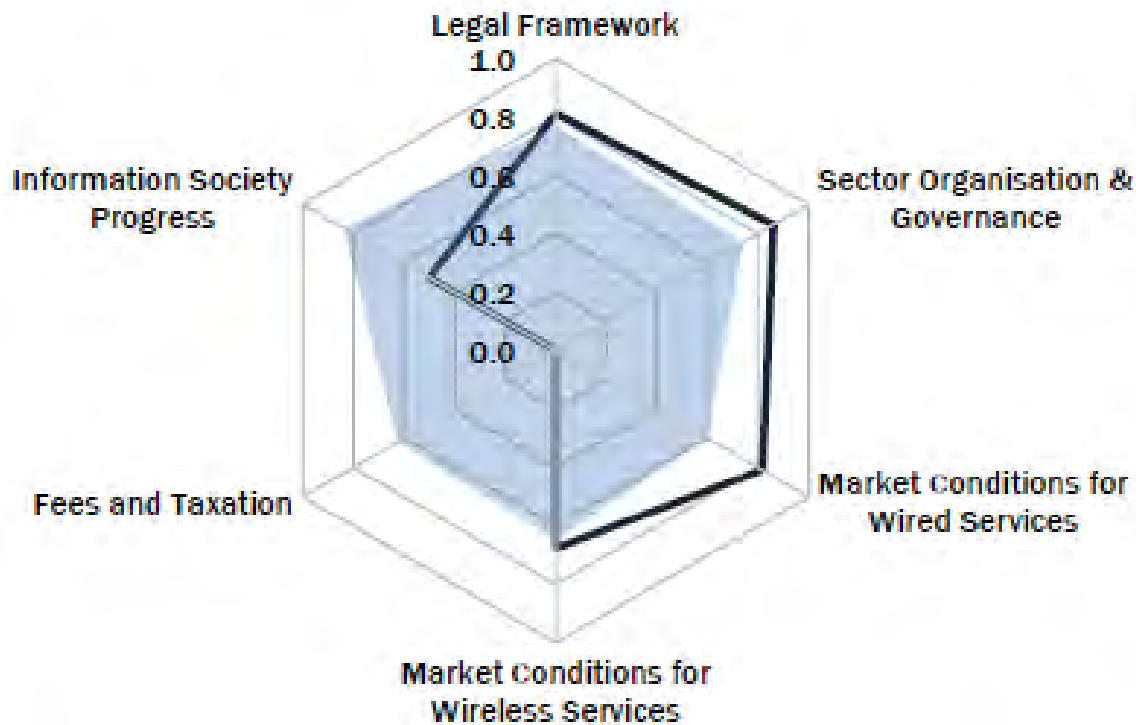


Figure 6. Overall legal/regulatory risk for telecommunications in Turkey (from EBRD, 2012a).

It is clearly seen that the fees and taxation criterion is a clear risk followed by information society progress. Taxes in the telecommunications sector are the highest in the world, thus the score of Turkey is lowest, literally being zero. Also, most parameters for information society progress, such as maturation level of electronic commerce legislation, restrictions on expression freedom and access to information, do not map well to international best practices. Thus, Turkey's risk is high with regard to this dimension. On the other hand, legal framework and sector governance are close to international best practices. This is in parallel with the proposition of Atiyas which ways that "the primary legislation, although not perfect, and not completely aligned with that in the EU, presents

a coherent framework on which to build measures to liberalize the telecommunications industry and enhance competition” (Atiyas, 2011).

D. CHAPTER SUMMARY

Communications and information technologies are two subsectors of the ICT sector. Because of the strong interdependence and convergence of technologies within it, the ICT sector is also examined to the extent required for analyzing the communications sector. The communications sector is comprised of three segments: fixed communication, mobile communication, and communication equipment. In Turkey, share of the ICT sector in GDP is low in comparison with EU and OECD countries. Particularly, share of the IT subsector within the ICT sector is too low in comparison with the world. This presents a weakness, but also provides an opportunity for growth in the ICT sector and general economic development of Turkey. Turkey is the seventeenth largest economy of the world. Also, Turkey is a growing market with a young population prone to using technology. These provide good opportunities for the development of the ICT sector in future.

Currently, there is an incumbent operator, Turk Telekom, and other smaller operators in the fixed telephony market, but the share of smaller operators has gradually increased after the opening of the fixed telephony market to competition. For the mobile market, the number of mobile network operators is three and this provides better competition in mobile market.

As a candidate for full membership to the EU, Turkey has been aligning its legislation with EU acquis. The electronic communications legislation legal framework is aligned with EU acquis to some extent, but more harmonization is required. Overall, the current legal framework provides a consistent framework for development of the electronic communications sector. The main risks for the regulatory framework are too high taxes—literally highest in the world—and the progress of an information society.

III. METHODOLOGY

This chapter explains the research methodology used in this study. PESTLE analysis, Porter's Five Forces analysis, SWOT analysis, and critical success factors (CSFs) are used for a comprehensive analysis of the Turkish telecommunications industry in the next chapter. In this chapter, these analyses methods are discussed to give the reader an understanding of the methodology.

An environmental analysis includes external and internal analysis. External analysis includes macro environmental and micro environmental analysis. There are different tools for each analysis type. In this study, PESTLE analysis is used for understanding the macro environment, Porter's Five Forces is used for micro environmental analysis, and SWOT is used for both external and internal environment analyses. Figure 7 illustrates the analysis types and the tools used for them. Then, the CSF method is used to determine critical success factors and key success factors based on the results of these analyses.

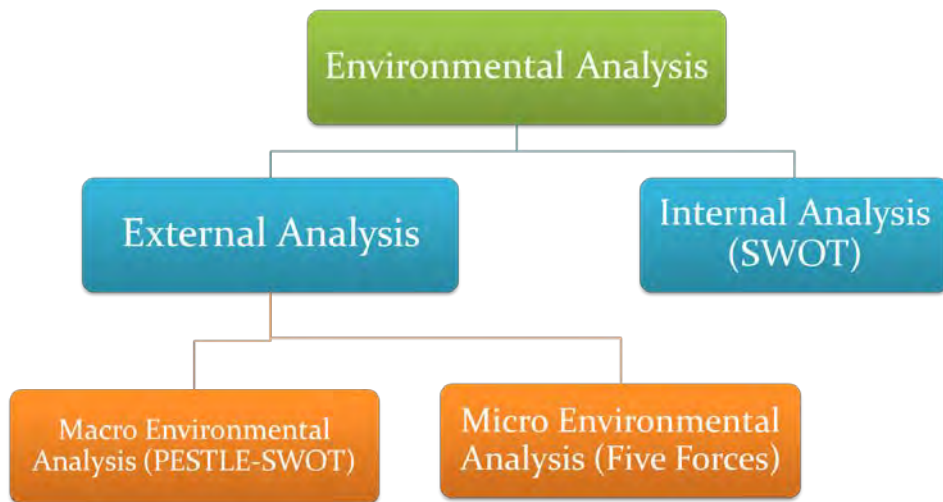


Figure 7. Environmental analysis and tools used.

A. PESTLE ANALYSIS

PESTLE stands for political, economic, social, technological, legal, and environmental factors. It is a method used to analyze external macro environmental factors for a sector or business and helps the strategic level decision-making process by making the bigger picture more understandable.

Political factors include government policy, tax policy, laws on labor and trade, political stability, etc. Economic factors include growth rate, inflation, labor costs, and similar factors. Socio-cultural factors include demography, education, cultural norms, and similar factors. Technological factors include new technologies, research and development, technology transfer, and communication. Environmental factors include sustainability, carbon footprint targets, resource management, etc. Legal factors include consumer laws and rights, product safety, court system, equal opportunities, etc. Table 1 includes typical content for a PESTLE analysis.

Political Factors • Services • Infrastructure • Tax Policy • Regulation	Economic Factors • Growth Rate • Inflation • Labor Costs • Business Cycle	Social/Cultural Factors • Demography • Education • Cultural Norms • Income Distribution
Technological Factors • Emerging Technologies • Technology Transfer • R&D Efforts • Communications	Legal Factors • Regional Laws • Law Enforcement • Court System	Ecological Factors • Resource Management • Energy Availability • Workforce Health • Climate Change

Table 1. PESTLE analysis (after Shapiro, Andrea 2013).

SWOT and PESTLE analyses are two different methods, but they may include common criteria. PESTLE analysis may be helpful to determine SWOT factors and thus PESTLE is useful before SWOT. PESTLE analysis assesses external factors. SWOT analysis includes both external and internal factors. The results of PESTLE analysis can be used to determine two external factors in SWOT analysis, which are opportunities and threats. Best practice for using PESTLE and SWOT analyses together is performing

PESTLE analysis and using the results for the external factors of SWOT analysis that include opportunities and threats.

B. PORTER’S FIVE FORCES

The Porter’s Five Forces model was developed by Harvard Business School professor Michael E. Porter in 1979. Porter lists five forces that determine the state of competition in an industry: threat of entry, replacement products, power of buyers, power of suppliers, and competitive rivalry. This method can be used for gaining competitive advantage, analyzing the position of an organization, and finding ways to improve that position, and understanding forces affecting an industry and then determining its attractiveness level (Traveria and Esquerrà, 2011). In this study, Porter’s Five Forces model is used to evaluate forces that affect the Turkish telecommunications industry.

C. SWOT ANALYSIS

SWOT is the acronym for strengths, weaknesses, opportunities, and threats. It is a common systematic analysis tool used to support the decision-making process; see Figure 8. Strengths and weaknesses represent the internal attributes that help or harm in achieving an objective. Opportunities and threats represent the external conditions that help or harm in achieving an objective (Hay & Castilla, 2006). Strengths should be maintained and leveraged, and weaknesses should be counterbalanced.

SWOT analysis helps answering these questions:

- how to use strengths to take advantage of opportunities,
- how to overcome the weaknesses that prevent me taking advantage of these opportunities,
- how to use strengths to reduce the likelihood and impact of threats,
- how to address the weaknesses that will make these threats a reality.

By answering these questions, tactics can be determined and then they can be used to create a project plan or strategy (“PESTLE and SWOT analyses,” 2014).

Enhanced SWOT Analysis

Translate into tasks for the Project Plan	Strengths	Weaknesses
	How do I use these strengths to take advantage of these opportunities?	How do I overcome the weaknesses that prevent me taking advantage of these opportunities?
Opportunities		
Threats	How do I use my strengths to reduce the likelihood and impact of these threats?	How do I overcome the weaknesses that will make these threats a reality?

Figure 8. SWOT analysis (from PESTLE and SWOT analyses, 2014)

SWOT can be applied to a company, product, or industry. In this study, SWOT will be applied to an industry—the Turkish telecommunications sector.

D. CRITICAL SUCCESS FACTORS (CSF)

It is important to understand the key points for success. Rockart defines critical success factors (CSFs) as “The limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where things must go right for the business to flourish. If results in these areas are not adequate, the organization’s efforts for the period will be less than desired” (Bullen & Rockart, 1981). CSFs are closely related to the strategic goals and mission of a project or an organization. According to the British online management and leadership training provider, Mind Tools, while mission and strategic goals define what an organization aims to achieve, CSFs focus on the most important areas and on how to achieve these goals. For example, if you are a tire company your mission can be to become the second largest tire producer in your country’s market within five years and your goals may include increasing your customer royalty rate to 90 percent and

increasing your market share by 2 percent each year. You can then define your critical success factors as retaining your current customers and attracting new customers. The number of critical success factors should not be too great as focus can be lost as the number increases. Thus, five or fewer CSFs might be helpful according to Mind Tools.

E. CHAPTER SUMMARY

This chapter explained the methodology used for the analysis in the next chapter. Environmental analysis is divided into two as external and internal environments and then external environment is further divided into macro and micro environments. PESTLE, Porter's Five Forces, and SWOT analysis will be used for macro environmental analysis, micro environmental analysis, and internal analysis, respectively. Then, CSF will be used for determining the critical factors for success in the next chapter.

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IV. ANALYSIS OF TURKISH COMMUNICATIONS SECTOR

The purpose of this chapter is to analyze the Turkish telecommunications sector using PESTLE and SWOT analyses tools and Porter's Five Forces Model, and then defining critical success factors based on them in order to determine key points for the sustainable success, development, and competition of the sector.

A. PESTLE FOR EXTERNAL MACROECONOMIC ANALYSIS

In the following PESTLE analysis, each factor is examined under strengths, challenges, future expectations, and risks dimensions in order to help readers to better understand each dimension.

1. Political Factors

Political factors include stability or instability of political environment, government influence and involvement on commercial agreements and tax policies, attitudes of political parties, tariffs, labor law, and environmental law. As political factors affect overall economy and businesses, organizations need to adapt their policies accordingly (Marketing Theories – PESTEL Analysis, 2014).

a. Strengths

Turkey is a member of the OECD, NATO, and G20. Also, membership negotiations with EU have been in progress since October 3, 2005. All these memberships contribute to Turkey as they create strong political and economic ties between the world and Turkey.

Turkey has been harmonizing its policies with the EU acquis that includes 33 different chapters. Eight chapters are currently suspended in accordance with the decision made by the General Affairs and External Relations Council. For the remaining 25 chapters, Turkey has been adopting and implementing the EU acquis. Public support for EU membership has been typically high in Turkey. Chapter 10 of EU Acquis is information society and media, which includes the telecommunications sector. EU

Acquis is one of the most detailed and comprehensive modern regulations. Thus, EU membership perspective is a strong external incentive and dynamic that moves forward the ICT sector regulations together with regulations of other sectors. Thus, strong public and political support for EU membership contributes to development of the ICT sector. The level of government support for EU membership has differed from time to time because of various political and economic reasons, and during times of decreased support, ICT sector progress slowed, especially in regulatory progress.

As of April 2014, Turkey has been ruled by a single government party, AKP – Justice and Development Party, for 12 years. This was a contributing factor to effective governance. Legislation and execution mechanisms were directed from the same party, enabling faster progress and implementation.

Also, public opposition to non-democratic governments can be counted as a strength. In the 1950, 1965, 1973, 1983, and 2002 elections people supported political parties and leaders who promised more freedom. Stronger integration of Turkey with the world created and nurtured a well-educated and wealthy middle class supporting democracy. Telecommunications regulations are affected by this trend, and more freedom of expression and freedom of speech will be available in the long term.

b. Challenges

As seen in Figure 9, taxes applied on the telecommunications sector are the highest taxes in the world (Deloitte, 2014). Especially, taxes applied to mobile services are too high. The telecommunications sector, and mobile services in particular, help to grow the economy. Mobile services contribute to investment increase, technology development, productivity, economic growth, income inequality and poverty decrease, and tax revenue increase. Findings illustrate that a 10 percent increase of mobile penetration rate results in a 1.2 percent GDP increase. High taxes increase costs, resulting in lower sector growth (Deloitte, 2014). As a result, high taxes restrain mobile sector growth and their economic benefits.



Figure 9. The tax burden on mobile services (from Deloitte, 2014).

Despite the single-party government, political tension has been high during the period between 2002 and 2014. The presidential election held in 2007 was a stressful election and created high political tension. The Turkish Armed Forces put a controversial statement on the General Staff website which drew reactions from the government and other institutions of Turkey, as well as from the international community. The presidential election deadlock in the parliament paved the way for an early election later in 2007 in which AKP won a landslide election victory with the contribution of people who felt disappointed because of the interference of Armed Forces in politics. Despite this landslide victory of 47 percent, AKP could hardly escape from being shut down in 2008 based on the allegations of violating the separation of religion and state principle. On the other hand, after the end of the 2008 when that case was over, various legal cases were opened mainly based on the allegations of military coup plans and many active duty and retired military personnel were imprisoned. After the 2011 elections, AKP became the most important and effective actor in the political arena with a relatively weak opposition in its third term. This political scene let the government to increase its control over other intuitions and public discontent increased as a result. During June 2013,

protests occurred which reflected public reaction against government policies and discriminatory language used by the prime minister regarding opposition and protestors.

In December 2013 corruption records were uploaded on the Internet and four ministers resigned because of the allegations in those records. There were also allegations of corruption about the prime minister and his son. Many high-ranking police officers and judicial personnel, including prosecutors and judges, were displaced by the government. Twitter and YouTube were banned temporarily before local elections held on March 30, 2014, mainly because of corruption allegations against government members. Increasing public discontent against government may further increase political tension and the lack of a healthy communication between the opposition and government may cause a political crisis.

The Kurdistan Workers' Party (Partiya Karken Kurdistan, or PKK) terrorist movement emerged as a threat in early 1980s and still performs terrorist attacks from time to time. Although it has stayed dormant for the last two years for political reasons, it is still a security threat. On the other hand, economic resources used against the PKK were enormous, especially during the 1990s, and spending resources on military expenses instead of investments played a role in the economic crises of 1994, and 1999, 2001.

Current political and armed conflicts around Turkey are other political concerns. The war between Iran and Iraq during 1980 to 1988, two Gulf Wars and their results, disintegration of Yugoslavia and the Bosnia War, disintegration of the USSR in 1991, the Azerbaijan-Armenian War, Russia's recognition of Abkhazia and South Ossetia on lands of Georgia in 2008, the continuing civil war in Syria, increasing tension in Ukraine, and Russia's annexation of Crimea shows that the region around Turkey is not politically stable except for the European Union.

The aforementioned political problems may slow down or even reverse democratic reforms made so far. Normalization of the internal and external political environment may take time as the reasons behind the problems are not easy to solve. Some prohibitive policies of the government put restrictions on freedom of expression. Also, corruption and non-transparency remains as an important issue. Creating and

nurturing a competitive and effective ICT sector within this political environment is more difficult than it would normally be.

c. Future Expectations

ICT regulations have become more aligned with EU *acquis* and harmonization will continue in the future in line with the EU membership perspective, making the ICT sector more competitive and more liberal. European Union accession negotiations for full membership help Turkey develop its ICT sector, particularly the ICT regulatory framework.

d. Risks

Corruption and non-transparency can be mentioned as a political risk. The Supreme Council of Radio and Television (RTUK) is the independent media regulator authority in Turkey. However, RTUK is open to political influence of parties as its members are chosen from a pool of candidates by the parliament in proportion with the number of seats parties hold, which raises concerns about its impartiality (Data Monitor, 2012).

2. Economic Factors

Economic factors include factors such as growth rate, market size and composition, inflation, labor costs, and interest rates.

a. Strengths

As of 2013, Turkey is an emerging market, and it is the seventeenth largest economy of the world with a GDP around \$800 billion dollars. The GDP growth rate of Turkey was fast in 2010 and 2011, 9.2 percent and 8.8 percent, respectively. However, 2012 growth dropped to 2.2 percent, followed by 3.8 percent in 2013. OECD expects Turkey's GDP to grow around 4 percent between 2013 and 2015 (OECD, 2013a). High GDP growth rate contributes to ICT sector development and telecommunications sector growth. The ICT sector average growth rate was 14 percent between 2002 and 2010 (Data Monitor, 2012), making it among the fastest growing sectors of Turkey.

The Turkish economy historically was based on agriculture and industries requiring low-skilled human resources, such as textiles, but industrial development changed this picture significantly within the last 30 years. Turkey is a significant automotive and home appliances producer of Europe. The shipbuilding industry is among the top five in the world. Developing industry needs is another contributor to increasing GDP and development of the telecommunications sector.

Turkey has a strong and sound financial sector. Structural reforms after the 2001 economic crisis strengthened the finance sector and enabled banks to keep their positions and net profits against the global financial crisis. The financial strength of banks enables investment in the economy. Sound macroeconomic strategies and fiscal policies aimed at bringing more foreign direct investment (FDI) and managing economic development were followed in the last decade. The number of organized industrial zones designed to help industrial development and increase employment reached 250 by 2010, and 120 were fully operational by 2009 (Data Monitor, 2012).

All these economic factors contribute to development of the economy in general and the ICT sector specifically as it is closely tied with the general economy.

b. Challenges

The current account deficit of Turkey has increased sharply in the last decade and remains as the most important challenge for economy. Turkey is an energy importing country and this is the main reason for its current account deficit. Import of consumption goods and dependence of export on intermediate goods are other contributors to the current account deficit increase. The high current account deficit makes the economy vulnerable to global financial problems (Data Monitor, 2012). The ICT sector contributes to the current account deficit as most ICT consumer products are imported. According to YASED (International Investors Association), the ICT sector of Turkey contributes \$7.8 billion to the current account deficit (YASED & Deloitte, 2012). While the OECD average for share of ICT products in total exports is 8 percent, this rate is only around 2 percent in Turkey (YASED & Deloitte, 2012). It is important to increase exports and decrease the deficit in the ICT sector as this is not sustainable in the long term.

Determining and applying well-defined and well-designed strategies that will increase ICT export are important in this context. Table 2 and Table 3 indicate market sizes for Turkish information technology sector and Turkish telecommunications sector respectively. The first line indicates total market size which is equal to total local production plus total imports minus total exports. The estimated sizes are given for 2011 and 2012.

	2009	2010	2011 (est)	2012 (est)
Total Market Size	5,600	6,160	6,776	7,454
Total Local Production	2,300	2,530	2,783	3,061
Total Exports	1,200	1,320	1,452	1,597
Total Imports	4,500	4,950	5,445	5,990
Exchange Rate: 1 USD	TL 1.54	TL 1.49	TL 1.54	TL 1.54

Table 2. Market size estimate for the IT sector excluding the telecommunications sector, Unit: USD thousands (after U.S. Commercial Service, U.S. Department of Commerce, 2011).

	2009	2010	2011 (est)	2012 (est)
Total Market Size	19,300	21,000	23,100	25,310
Total Local Production	12,800	14,000	15,400	16,940
Total Exports	2,900	3,500	3,850	4,335
Total Imports	9,400	10,500	11,550	12,705
Exchange Rate: 1 USD	TL 1.54	TL 1.49	TL 1.54	TL 1.54

Table 3. Market size estimate for the telecommunications sector excluding IT, Unit: USD thousands (after U.S. Commercial Service, U.S. Department of Commerce, 2011).

In Turkey, share of the ICT sector in GDP is 3.5 percent (YASED & Deloitte, 2012). As can be seen in Figure 10, this rate is much higher in developed countries having information societies. While the Turkish economy constitutes more than 1 percent of the world economy, Turkey's share in the global ICT sector is 0.75 percent (YASED & Deloitte, 2012). Share of the ICT sector within GDP indicates both a growth potential and a weakness. ICT sector growth contributes to GDP growth significantly as it is a

sector that creates high value. To overcome this challenge, Turkey should develop policies to increase ICT sector share in GDP.

Low GDP per capita is another economic challenge. Turkey is ranked at 34 out of 34 OECD countries, with a GDP per capita slightly over \$10,000. Also, Turkey has one of the worst income inequality distribution rates among OECD countries. Both indicators are challenges for the general economy and the ICT sector in particular. Low income and income inequality mean that most of the population has a much lower income than average and this clearly restricts wider usage of the ICT sector by the public because of economic reasons. As an example, mobile subscriptions and broadband subscriptions per capita are among the last three in OECD countries. Also, most revenues per capita are much lower than OECD average which negatively affects ICT sector growth.

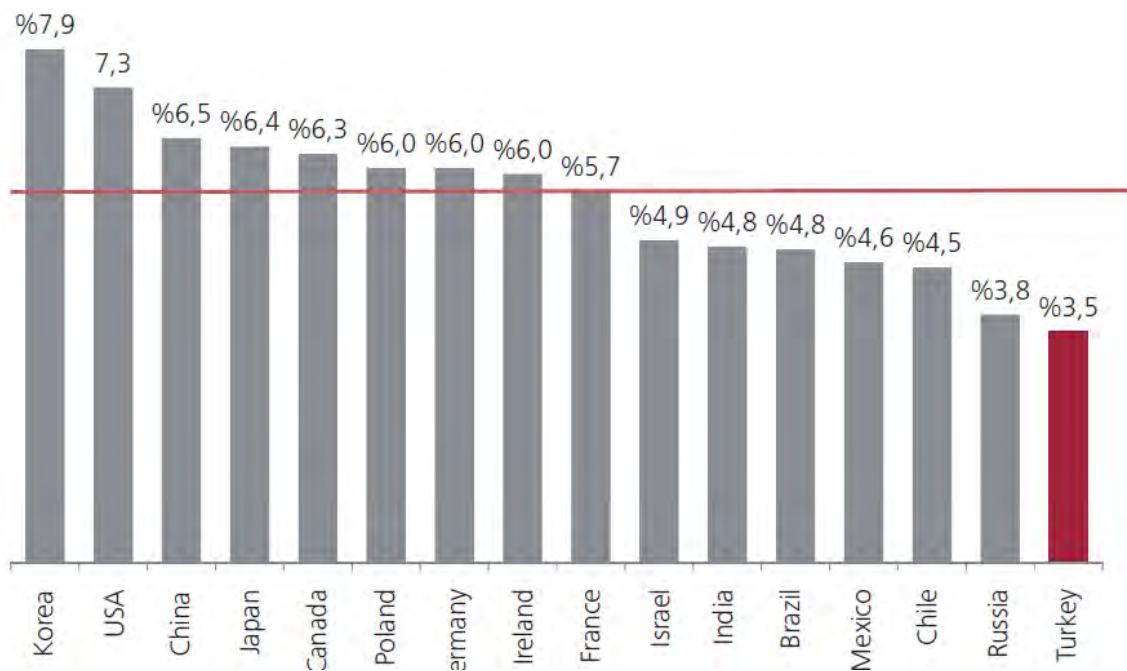


Figure 10. Share of ICT sector in GDP (from YASED & Deloitte, 2012).

The high unemployment rate is another further challenge. While the OECD average is 7.7 percent, the unemployment rate of Turkey is 8.9 percent as of November 2013 (OECD, 2014). This high unemployment rate is a contributing factor to low GDP. Furthermore, a high informal employment rate and the size of the informal economy are

other economic challenges for the general economy and the ICT sector in particular as these two factors cause lower wages and loss of tax revenue.

Venture capital is used as one of the significant funding mechanisms for the ICT sector in the world. Venture capital investments are not well developed in Turkey yet. According to the World Economic Forum, Turkey holds the eighty-third position among 148 countries in venture capital availability (Schwab, 2013). Entrepreneurs in Turkey are inexperienced about universally accepted venture capital standards. Inapplicability of globally accepted applications hampers growth of venture capital funds (YASED & Deloitte, 2012).

In the coming years, a middle-income trap can pose a challenge for Turkey. The middle-income trap means that a country gets stuck at a certain level of income after reaching that income level. The GDP of Turkey exceeded \$10,000 per capita in 2008 compared to only \$3,000 in 2001. The GDP decreased in 2009 because of the global financial crisis and then increased back to \$11,000 per capita in 2014. As can be understood, GDP was stuck at slightly over \$10,000 after 2008. Gursel and Soybilgen mention the reasons for the high growth rate and increasing GDP between 2001 and 2008 as high spending on investments, employment increases in non-agricultural sectors, and a high productivity increase, as well as the appreciation of the Turkish Lira against other currencies (Gürsel & Soybilgen, 2013). The authors add that this high growth rate will not continue because of decreasing global liquidity. They also warn that labor productivity increase stopped in the last two years. If Turkey gets stuck in a middle-income trap, the communications sector will also be affected negatively.

c. Future Expectations

As explained in the previous subsection on economic challenges and as seen in Figure 10, share of the ICT sector in GDP is lower than in the countries with stronger information societies. This indicates a significant growth potential for the Turkish ICT sector. Turkey has the highest youth population rate in comparison with EU countries. As of 2012, median age is 29.7 and expected median age by 2030 is 36.5 (Euromonitor, 2013). The ICT sector is used widely and adopted quickly by the young population and

thus it is the driving force for ICT sector growth. The Turkish ICT sector is expected to grow faster than the Turkish economy (YASED & Deloitte, 2012). Spread of emerging new services such as mobile payments, machine-to-machine communication (M2M), and mobile signature will contribute to growth of the sector (YASED & Deloitte, 2012). Also, the e-commerce sector is not mature yet and has quite a large growth potential. It grows much faster than the ICT sector and contributes to ICT industry growth.

d. Risks

The high current account deficit and currency volatility is a problem for the general economy and the ICT sector. As stated in the earlier subsection on economic challenges, ICT sector share in the current account deficit is significant. An increase of the ICT import-export difference is a risk for the current account deficit. Currency volatility is another concern. Significant increase or decrease of foreign currencies against the Turkish Lira causes economic instability. Increasing internal and regional political risk factors, high current account deficit, and stricter financial policies of developed countries are factors causing currency volatility.

Another risk is inefficient infrastructure investments. Different infrastructure networks owned by different companies on the same route causes investment inefficiencies, and increased service and maintenance costs (YASED & Deloitte, 2012).

Political problems in neighboring markets such as Europe, the Middle East, Caucasus, and the Balkans may affect the ICT sector negatively as Turkish companies and investors have significant investments in many sectors of those markets, including the ICT sector. As an example, Turkcell, the largest mobile operator of Turkey, operates in Ukraine, Belarus, Germany, Cyprus, Kazakhstan, Azerbaijan, Georgia and Moldova.

On the other hand; poor workforce quality, high tax rates, tax regulations, inefficient bureaucracy, insufficient venture capital, poor work ethic, restrictions in labor regulations, price-based bidding policy, violations of intellectual property rights, and corruption can be mentioned as the risk factors threatening ICT sector growth (Schwab, 2013; YASED & Deloitte, 2012).

3. Socio-Cultural Factors

Social or socio-cultural factors include factors such as demography, population growth, education, cultural norms, and distribution of income.

a. Strengths

Turkey has a young population inclined to adopt and use technology and various communication means. Turkey has the youngest population in the EU zone. Also, Turkey has a large and increasing population which is expected to reach 86.8 million with a median age of 36.5 by 2030 (Euromonitor, 2013). Thus, the ICT sector will be positively affected by the high youth population rate and an increasing population.

b. Challenges

The population of Turkey is getting older. The median age is 29.7 as of 2012 and this will increase to 36.5 by 2030 (Euromonitor, 2013). As the driving force for the ICT sector is the youth population, the aging population may create a challenge for the ICT sector development.

Another more important challenge is a poor education system. In December 2010, OECD rated Turkey as 32 out of 34 countries in scientific literacy. Economic growth will depend on knowledge; the economy and ICT sector require a well-educated work force (Data Monitor, 2012). According to 2012 PISA (Programme for International Student Assessment) Test results, Turkey is ranked 42 in math, 44 in reading, and 43 in science among 64 countries (OECD, 2012). This is a very important and difficult challenge for both economic growth and development, and for ICT sector development in particular, as it depends on a well-educated work force. To overcome this challenge requires a carefully designed and long-term education plan.

Income inequality and poverty can be mentioned as other challenges for both the general economy and ICT sector in particular. As of 2014, both income distribution and the GDP of Turkey are among the worst in OECD and EU countries, which means that more Turkish people earn much less than the average income, leading to one of the highest poverty rates in the OECD and EU. As indicated in the earlier subsection on

economic challenges, low income that is distributed unequally restricts ICT services usage.

c. Future Expectations

Although the “neither employed nor in education” (NEET) rate, particularly the women’s NEET rate, is high among young people, this rate is declining. The NEET rate for young among the ages of 15 to 29 fell 7 percent between 2008 and 2011 (OECD, 2013c). Participation of women in education and the workforce helps improve their social status. Although PISA 2012 scores were below OECD average, both mathematics performance and education equity levels of Turkey improved in comparison with PISA 2003 results. Turkey carried out targeted policies to enhance performance of less successful students and regions and allocated more resources for the ones who most needed them (OECD, 2012). Also, the FATİH (Movement of Enhancing Opportunities and Improving Technology) project is worth mentioning as an influence on educational improvement, in case this project becomes successful in the coming years. This project aims at distributing tablets for all students in public schools, equipping all classrooms with smart boards, and creating qualified educational content for courses and thus improving the quality of primary education. All these improvements in education may lead to better educated students and improve the ICT sector which requires a skilled workforce.

d. Risks

Problems in the education system cause a skill mismatch. Skill mismatch means a disproportion between job requirements and employee skills. Employing an overeducated employee for a job causes inefficiency. On the other hand, most sectors that need skilled employees have difficulty in finding such employees, and the ICT sector is not an exception. Employers have difficulty in finding highly qualified workers. In Turkey, the skill mismatch problem is much worse for women and the young population. The number of new jobs created is not enough to employ a highly skilled workforce produced by the education system (Bartlett, Johansen, & Gatelli; n.d.). Policies should be developed to address this skill mismatch problem.

The NEET rate for the population between 15 and 29 years old is 35 percent in Turkey. This is the highest rate among OECD countries and more than double the OECD average of 16 percent. One of the most significant factors contributing to this gloomy statistic is the women's NEET rate of 50 percent versus the men's NEET rate of only 20 percent. This indicates that most of the women between the age of 15 and 29 are staying home and raising their children (OECD, 2013c). Thus, it can be concluded that the NEET rate could be much more optimistic if women's employment and education rates were better. Increasing women's participation in the workforce is an important factor for economic development and wealth.

4. Technological Factors

Technological factors include innovation, research and development, automation, emerging technologies, and technology infrastructure.

a. Strengths

The ICT sector is being strongly supported by government within the scope of the Vision 2023 strategy of government. Vision 2023 aims to include 30 million broadband subscriptions, increasing the domestic provision rate to 50 percent for ICT products and services, increasing ICT sector share to 8 percent of GDP, providing all public services in a digital environment by 2019, and increasing computer literacy to 80 percent. Government-supported R&D expenses are also increasing in terms of both amount and as share of GDP, and reached 0.92 percent of GDP in 2011 in comparison with 0.4 percent of GDP in 1998 (Data Monitor, 2012).

b. Challenges

Protection and enforcement of Intellectual Property Rights (IPR) are not well managed in Turkey and copyright piracy is common. As a result, Turkey is on the watch list of the Intellectual Property Association (IPA). For example, the piracy rate for business software is around 62 percent, indicating the magnitude of the piracy challenge and the poor quality of the IPR environment (Data Monitor, 2012). This challenge both causes tax loss and threatens new product development in the sector.

In some specific areas, insufficiency of technology infrastructure is another challenge. Especially low broadband and FTTH rates can be mentioned among significant technological challenges. The FTTH subscription rate is among the lowest in OECD countries and the main reason is insufficiency of fiber infrastructure. Also, problems experienced while laying down fiber networks prevent or delay fiber and other fixed line infrastructure investments (YASED & Deloitte, 2012).

c. Future Expectations

Turkey declared 50 areas scattered around the country as Technology Development Zones (TDZs) that are aimed at supporting R&D activities in technology, and 34 of these are currently operational. The remaining 16 TDZs are under construction. Techno-parks aim at developing technology through R&D using institute, university, or R&D center facilities in which they are located and transforming innovation into products or services. The government applies quite significant tax exemptions on software products, personnel salaries, investments, and R&D activities in TDZs. Tax exemptions will remain in force until the end of 2023. These advantages in TDZs are expected to attract domestic and foreign investors and thus support ICT sector development (The Republic of Turkey Prime Ministry Investment Support and Promotion Agency, 2014).

Turkey has large, established, and well-branded producers of consumer electronics and home appliances. Production base in electronics and home appliances indicates a potential extension into the ICT consumer products market. As an example indicating this potential, Turkcell, the largest mobile operator of Turkey, introduced the first domestic smartphone of Turkey in 2013. This smartphone was produced by Vestel, one of the largest home appliances and consumer electronics producers of Turkey and the EU. The 100,000 of these phones sold within the first two and a half months and contributed \$250 million to the economy (Turkcell, 2013). This success story shows that Turkey currently has the ability to produce ICT consumer electronics products by itself and sell them in the domestic market. This success also shows that part of the current account deficit caused by the ICT sector can be decreased this way.

The FATİH (Movement of Enhancing Opportunities and Improving Technology) project is another important future prospect. This project aims at distributing tablets for all students in public schools and equipping all classrooms with smart boards to improve the quality of primary education. Also, it includes creation and delivery of e-content required for the curriculum. Preparation of hardware and software infrastructure and delivering content for such a large-scale project requires quite a large amount of investment for the infrastructure. Thus, this project has the potential to draw large international ICT players to Turkey and enhance ICT infrastructure. Considering all these factors, ICT sector growth will be positively affected by this project.

d. Risks

Poor innovation and cooperation can be mentioned among the risks in the ICT sector. This sector is a technology intensive sector and innovation is a critical factor for gaining competitive advantage. According to Innovation Union Scoreboard 2014, Turkey is a modest innovator and holds 32nd place among 34 states, which include 28 EU states, Switzerland, Iceland, Norway, Serbia, and Former Yugoslav Republic of Macedonia. Although relative performance of Turkey increased from 0.36 percent in 2006 to 0.40 percent in 2013, it is still low. Revenues from patents and licenses, community designs and trademarks, new doctorate graduates, and scientific publications are among the relative weaknesses of Turkey (Hollanders & Es-Sadki, 2014).

One of the important factors for value creation in the ICT industry is the number of patents. Commercialization of research is relatively weak in Turkey. As of 2012, the number of patents Turkey got from the U.S. Patent and Trademark office was 0.6 per million capita, which is lower when compared to BRIC (Brazil, Russia, China, and India) countries (Marketline, 2013). As mentioned in earlier, enforcement of weak IPR laws prevents technology development. Clearly, policies aimed at increasing the number of patents per person should be developed.

5. Legal Factors

Legal factors include laws, regulations, court system, standards, and law enforcements. In this subsection, Ministry means the Ministry of Transport, Maritime Affairs and Communications of Turkey.

a. Strengths

According to the 2012 Doing Business report of The World Bank and 2011 Index of Economic Freedom of *The Wall Street Journal* and Heritage Foundation, the business environment in Turkey is moderately friendly. While OECD average is eleven days, average time required to start a business is six day in Turkey (Data Monitor, 2012).

The telecommunications sector of Turkey is governed by the 2008 Electronic Communications Law (ECL). Turkey's legislative framework is mostly based on the 2003 Electronic Communications Regulatory Framework of EU (EBRD, 2012a). The sector regulator, the Information and Communications Technology Authority (ICTA), has sufficient direct penalty enforcement authority without court decisions. Also, the authorizations and competencies of ICTA and the Ministry are mostly well separated (EBRD, 2012a). Regulator independence and structure, numbering, consumer protection, interconnection, and access can be mentioned as strong points in the telecommunications legal framework. Figure 11 shows best practices as outer borders and Turkey as thick lines. The shaded area shows the average for 31 countries that are mostly located in Eastern and Southern Europe, the Middle East, and the former USSR region (EBRD, 2012a).

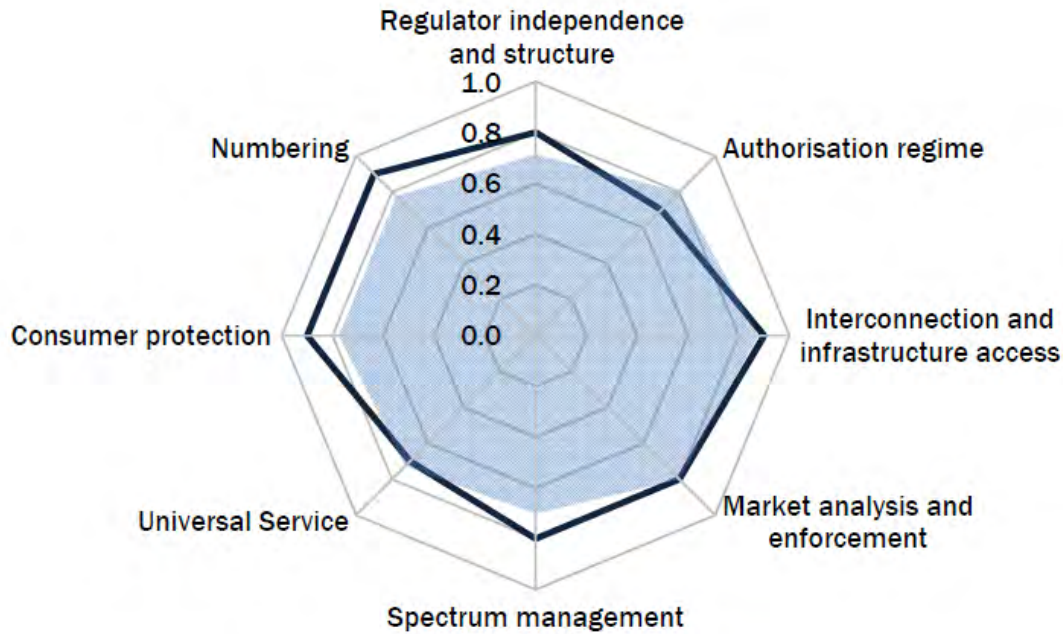


Figure 11. Legal framework comparison for the telecommunications sector of Turkey (from EBRD, 2012a).

b. Challenges

Legislative framework for Turkish telecommunications sector is not fully aligned with EU acquis yet. The EU 2009 Framework is not fully applied. According to Turkish 2008 ECL law; ICTA can conduct a tender in order to grant rights of frequencies among specific candidates instead of announcing an open tender. This can be acceptable according to EU framework, but it may also cause transparency problems (EBRD, 2012a).

Regulatory background for venture capital is not ready in Turkey yet, which prevents venture capital investments. Venture capital is one of the important financial resources for the ICT sector, especially for start-up companies at early stages that cannot provide traditional investment funds easily. Thus, insufficient legal background limits funding opportunities for start-up companies in the ICT sector.

Poor performance of the Turkish judicial system is another major concern. Unnecessarily long pretrial detention periods and delays in trials are serious problems. Also, the possibility of political intervention by the government is another concern. The

authority and power of the Minister of Justice has been extended recently, giving the minister the ability to affect the careers of judges and prosecutors using his power on the High Council of Judges and Prosecutors. Commercial cases exceed the capacity of commercial courts causing a resolution time of over one year on average. As mentioned previously court decisions, especially in high profile cases, are subject to interference by politicians sometimes causing contested verdicts (Data Monitor, 2012).

c. Future Expectations

In 2013, laws for protecting investors were included in the commercial code requiring company directors to distribute profits in case of liability resulting from abusive transactions. The new commercial code also enables stakeholders to request an auditor for investigating interest conflicts. This law contributes to protection of investors and thus may attract more investors and the ICT sector could be positively affected (Marketline, 2013).

EU acquis is one of the most developed set of regulations and laws for the ICT sector and the implementation of best practices for the ICT sector is also available in the acquis. Turkey has implemented the 2003 Electronic Communications Regulatory Framework of EU, but not the 2009 one yet. Future negotiations with EU will lead to adoption of the 2009 Electronic Communications Regulatory Framework of EU into Turkish ECL laws, for both primary and secondary laws.

The fiber infrastructure development rate and broadband penetration rate of Turkey are among the lowest in the OECD and EU. Turkey aims at increasing fiber and broadband infrastructures aggressively within the next ten years. Reaching these goals might be a driving force for legal improvements and speed up the EU framework adoption process. Regulatory measures can be taken to support fiber and broadband infrastructures.

d. Risks

According to ICTA regulation, the local infrastructure owners do not have to share their infrastructure and manholes, and thus, alternative operators cannot use idle

fiber infrastructure in return for a reasonable cost. Thus, alternative operators prefer building up their own fiber networks, but obtaining permits required from municipalities or other authorities for right of way or excavation is challenging. This is one of the most important problems preventing fiber infrastructure development in Turkey (YASED & Deloitte, 2012).

The prospect of EU membership is a driving force for the development of the ICT sector legal framework of Turkey. Possible slowdown or suspension of the EU membership process because of the unwillingness of the EU to accept Turkey as a full member, political choices of the Turkish government, or decreasing public support for EU membership can be mentioned as risks that may slow down adoption of EU acquis for the ICT sector.

Turkey has heavy taxes on the telecommunications sector and two different taxes are applied, putting the taxes in one of the highest places in the world in terms of both GDP per capita and total cost of ownership. Besides Value Added Taxes (VAT), a special communications tax is also applied. Mobile taxes are particularly high and this creates a barrier for using mobile services, especially for the poor (Deloitte, 2012). Operators experience the negative effect of high taxes as lower net profit per subscriber (YASED & Deloitte, 2012). Low net profit means less investment and less R&D for operators.

As mentioned in challenges in technological factors, Intellectual Property Rights (IPR) enforcement is a major concern for technological development. The legal framework for IPR should be aligned with EU acquis and IPR laws should be better enforced.

6. Environmental Factors

Environmental factors include weather and climate, changes in climate, and geographical factors affecting the business or sector. These factors are particularly important for sectors such as agriculture or fishing.

a. Strengths

Turkey is a signatory on various international environmental protection agreements, such as the Protection of the Black Sea Against Pollution, the Convention for Protection of the Marine Environment of the Mediterranean, the United Nations Framework Convention on Climate Change, etc. (Marketline, 2013). Also, Turkey signed the Kyoto Protocol in 2008 and is updating its environmental laws in line with EU accession negotiations. The laws on energy efficiency and renewable energy utilization have been recently accepted in line with EU *acquis* harmonization efforts. Thus, better environmental policies are applied and society is getting more sensitive about the environmental issues. The telecommunications sector is no exception, and both the government and private companies seem more concerned about environmental issues.

b. Challenges

High dependence on fossil fuels which cause significant air pollution is a major environmental concern. Environmental pollution may negatively impact human health and a country's economy (Marketline, 2013). The ICT sector is the fifth most energy-consuming sector (YASED & Deloitte, 2012), and thus, it contributes to pollution caused by energy production from fossil fuels. New renewable energy production methods should be used to prevent pollution caused by fossil fuels.

c. Future Expectations

According to the Environmental Performance Index 2012 of Yale University, Turkey held 109th place out of 132 countries. For 2014 Turkey ranks 66 out of 178 (Yale Center for Environmental Law & Policy, 2014). This implies environmental protection improvement in Turkey and leads to an expectation of a more sustainable ICT sector in general.

d. Risks

The increasing number of base stations, especially in highly populated areas, may risk human health. As laws and regulations do not impose sharing of resources in the ICT sector well, environmental pollution and problems caused by the ICT sector tend to

increase. Redundant infrastructure networks owned by different companies on the same route create environmental layout problems, particularly in urban areas (YASED & Deloitte, 2012). Continuation of this trend both harms the environment and the country's economy as resources are wasted.

B. PORTER'S FIVE FORCES MODEL FOR MICRO ENVIRONMENTAL ANALYSIS

In this section, Porter's Five Forces model is used to analyze micro environmental analyses.

1. Threat of New Entrants

By its nature, the telecommunications sector has high entry barriers as it requires very large investments at the beginning for infrastructure as well as customer acquisition and marketing activities.

In the Turkish fixed telephony market, new FTS (fixed telephony service) operators are increasing their market share against incumbent Turk Telekom. Although Turk Telekom is still incumbent in the fixed telephony market, it is exposed to considerable threat from new entrants. The same is also valid for broadband Internet. Turk Telekom is exposed to threat from new market entrants and losing market share. Both of these trends seem to continue as discussed in Chapter II.

For mobile communications, the threat from new entrants is lower as licenses are required from ICTA for a new mobile network operator. Also, there is no available radio spectrum left that will meet data and voice communication satisfactorily for now. On the other hand, MVNOs (mobile virtual network operators) can enter into the mobile communications market more easily as ICTA has been issuing new licenses since 2009 and MVNOs do not have to invest in infrastructure as they use infrastructure of existing operators (Boynudelik, 2011).

2. Threat of Substitute Products

Fixed communication market services, both telephony and broadband, are exposed to substitution by their mobile equivalents. Mobile voice service has been

replacing fixed telephony service since the early 2000s. Similarly, improving mobile broadband services threatens the fixed broadband market. Thus, Turk Telekom is exposed to threat from substitute services of the mobile communications market.

Substitution threat is also valid for the mobile communications market. Smartphones have diversified communication means dramatically within the last six to seven years. OTT (over-the-top) providers provide their services over the existing networks of network operators. Thus, it is possible to provide voice and text service through the Internet. So, using a smartphone connected to the Internet enables users to use any service provided by an OTT provider, including voice and text services. The effect of OTT providers may be disruptive. As an example, the current number of text messages sent over Whatsapp is more than all the text messages sent over all mobile network operators in the world. The same threat is also valid for voice market. OTT providers that provide voice and text messages such as Skype, Viber, and Tango are increasing their number of uses, and Whatsapp has plans to extend its service coverage to voice.

3. Power of Suppliers

As smartphone usage increased rapidly, popular smartphone suppliers such as Apple and Samsung gained significant power. Thus, having distribution and retailing agreements with these suppliers is an advantage for mobile network operators and having no such agreement can turn out to be a significant disadvantage. Having more agreements with more suppliers can help operators enlarge their user base.

Turkey is among the top countries in the world in terms of total cost of ownership to income level ratio. Thus, affordable smartphones are important for increasing penetration levels of smartphones and mobile broadband usage. Turkcell has produced its own smartphones under the T series with relatively lower prices. Turkcell T40 was introduced into the market in September 2013 and sold a million since then. Turkcell launched the T50 smartphone that supports 4G LTE technology under its own brand on July 2014. The 4G LTE technology is not available in Turkey, but is expected to be licensed soon. Vodafone is one of the largest telecommunications companies of the world

and this enables it to establish partnerships with smartphone suppliers. Vodafone also has its own smartphones. Thus, it can be concluded that Turkcell and Vodafone have decreased their level of dependence on smartphone suppliers to some degree and gained competitive advantage over Avea in this sense. Avea is also cooperating with suppliers so as not to become disadvantaged against these competitors. Avea agreed to have Nokia produce a Lumia 525 model especially for Avea at an affordable price and attractive contract offers.

As explained earlier, the power of suppliers has increased after smartphones were introduced and mobile network operators have to take them into consideration to keep their market share and competitiveness. On the other hand, the power of suppliers is not high in fixed telephony and fixed broadband markets as there are many providers with similar products that fixed network operators can cooperate with.

4. Power of Buyers

The power of customers has increased in both fixed and mobile markets. The increasing number of fixed line operators and increasing fixed-to-mobile substitution has forced incumbent Turk Telecom to reduce its prices. Similarly, fixed broadband prices have also fallen gradually because of increasing competition. For the mobile market, mobile number portability lets customers change their operators easily. Also, decrease of interconnection costs has enabled operators to offer flat-rates tariffs and this increased the power of buyers. The current mobile penetration rate is around 90 percent, and thus, operators are trying to gain new customers from other operators. All these factors indicate that buyers are powerful in the mobile market. Coverage could be an issue for users in scarcely populated areas as not all operators have the same coverage area, which decreases their power. However, this is not meaningful as the rate of users living in these areas is low within the overall population, and thus, operators cannot use coverage advantage effectively. Thus, it can be concluded that the power of buyers is high for both fixed and mobile communications markets.

5. Competitive Rivalry

The competition level is high for both fixed and mobile telephony and broadband markets. As mentioned earlier in the discussion of new entrants, incumbent fixed operator Turk Telekom is exposed to competition from new fixed line entrants and mobile market substitution. This high competition decreases profitability in the fixed market.

For the mobile market, the competition level is also high. Three existing mobile network operators in Turkey compete for existing customers as the market is mature. Turkcell is the first entrant in mobile market. Thus, it could gain a larger customer base at the beginning and has managed to keep that advantage until today. Telsim, later bought by Vodafone in 2005, entered into the market just a few months after Turkcell. Aria and Aycell entered into the market in 2001 and then merged into Avea in 2003. Turkcell holds 52 percent of the mobile market, Vodafone has 28 percent, and Avea has 20 percent as mentioned in Chapter II. Share of Turkcell decreased from 67 percent to 52 percent gradually since 2000 because of competition from Vodafone and Avea. Also, ICTA took measures such as applying mobile number portability and lower mobile call termination rates in order to decrease the dominance level of Turkcell in the mobile market (Boynudelik, 2011). As a result, Turkcell lost customers in favor of Vodafone and Avea.

Thus, it can be concluded that the level of competitive rivalry is high in both fixed and mobile communications markets. Competitors try to acquire customers of other operators as the mobile market has little room for growth and the fixed market is even shrinking. Thus, the profit margin is decreasing and operators are forced to find alternative sources of income to stay profitable.

C. SWOT ANALYSIS FOR INTERNAL AND EXTERNAL ANALYSES

As explained in Chapter III, SWOT and PESTLE analyses may be used together and PESTLE analysis results may be helpful for defining the external part of SWOT analysis (that is, opportunities and threats). In this section, SWOT analysis is made using the findings of PESTLE analysis in the previous section of this chapter. Also, other external sources are used. Among these, the ICTA Strategic Plan 2010–2012 and ICTA Strategic Plan 2013–2015 are two sources that are used extensively for this analysis (Turkish Information and Communication Technologies Authority, 2009; Turkish Information and Communication Technologies Authority, 2013). SWOT analysis of the Turkish telecommunications industry can be found in the appendix of this study.

D. CRITICAL SUCCESS FACTORS

Critical Success Factors (CSFs) are essential areas for success. Identifying them clearly, attracting the attention of each party who is interested in success of business or sector, and focusing on these factors helps avoid waste of resources and effort and keeps progress going on the right track (according to leadership training from MindTools.com). Using PESTLE and SWOT analysis methods, critical success factors are defined for the Turkish ICT sector, considering expert views, market research reports, academic papers, and international analyses and reports. As a good practice, the number of CSFs is limited to five to prevent loss of focus. To create a better and more competitive telecommunications sector, the performance measures of CSFs should be achieved. Table 4 lists five critical success factors for the Turkish telecommunications sector and defines performance measures to achieve these factors.

Critical Success Factors (CSFs)	Performance Measures
Availability of telecommunications means	- Increased penetration rate for fixed, mobile, and broadband access paths equal to or greater than EU/OECD averages - Availability of various telecommunications access paths for all population - Broader definition of universal services
Accessibility of telecommunications means	- Lower telecommunications access path to GDP ratio - Lower taxes for ICT sector products and services - Increased information technologies literacy among citizens - Closer penetration rate among all regions and demographic groups across the country
Increased innovation capacity	- Increased R&D expenses to GDP ratio to OECD/EU average - Increased researchers to employment ratio to OECD/EU average - Increased number of patents - Increasing conversion of R&D and research activities into products (venture capital) - Increasing educational quality in vocational schools and universities - Inclusion and retention of well-educated young women in labor force
Enhancement of Legal and Regulatory Framework	- Full adoption and implementation of EU ICT 2009 Regulatory Framework
Increase of ICT sector share in both GDP and annual export	- Increased size and variety of government led or supported information technology projects - Increased number and intensity of technology parks - Increased share of information services and software in information technologies subsector - Increased number of IT start-up companies - Increased and diversified amount of start-up investments - Increased clustering of large technology development zones around universities - Increased support for cooperation between university research centers and industry - Increased tax advantages and other economic incentives for domestic producers

Table 4. Critical success factors and performance measures to evaluate their achievability level.

E. CHAPTER SUMMARY

In this chapter, the Turkish telecommunications sector was analyzed thoroughly by using PESTLE for macro environmental analysis, Porter's Five Forces for micro environmental analysis, and SWOT for micro environmental analysis and internal analysis. These three methods were used together to achieve a comprehensive analysis and understanding of the Turkish ICT sector as they complement each other.

The results of macro environmental analysis revealed political instability in the neighboring regions, high tax rates applied on information and telecommunications sector, corruption and non-transparency in politics, chronic current account deficit of overall economy and imbalance between import and export amount of ICT sector, relatively low GDP, problems in education and skill mismatch, insufficient legal infrastructure and law enforcement for intellectual property rights, poor innovation, research, and development performance, and ineffective judicial system as problem areas preventing or slowing the development and flourishing of the Turkish ICT sector. On the other hand, macro environmental analysis indicated strong ties and involvement in global economic and political organizations, increasing harmonization of legislation with EU acquis, large market size, further economic growth potential for ICT sector, young population, and increasing political support for innovation, research, and development activities on the positive side.

Micro environmental analysis evaluated threat of new entrants, threat of substitute products, power of suppliers, power of buyers, and competitive rivalry level. Fixed telephony services operators and mobile virtual network operators were determined as new entrants threatening established fixed telephony and mobile network operators respectively. Mobile substitution was determined as a threat against fixed telephony services. Also, services of OTT providers were determined as a threat against mainstream services provided by network such as text and voice. It is found that power of suppliers was high, but also countermeasures were taken by network operators to neutralize this. Power of buyers was found to be increasing because of fixed-to-mobile substitution in the fixed market. Power of buyers is also increasing for mobile market because of decreased

interconnection costs and increased coverage of small operators. Based on all these factors, competition level was found as high in both fixed and mobile markets.

After analyzing the external environment, SWOT tool is used in order to complement external analysis. SWOT analysis can be found in the annex. Besides summarizing a list of opportunities and threats found through macro environmental analysis, SWOT analysis revealed internal strengths and weaknesses of the ICT sector. Internal strengths include increasing broadband penetration rate, increasing number of businesses in ICT sector, increasing R&D funding, developed consumer electronics manufacturing infrastructure, young population inclined to use new technologies, large e-government projects and government support for ICT sector, strong integration with world economy and growing market size. Weaknesses for ICT sector are found as very few global companies and brands, poor education system that cannot support innovation and high-skill human resources, high taxes imposed on ICT sector, low GDP and income distribution inequality, insufficient Turkish content creation, low coordination level between government organizations and private sector, and limited capital and investments to support R&D activities and ICT investments.

Then, critical success factors were defined based on the findings of these analysis tools and performance measures were defined to reach those critical success factors. Critical success factors for future development of the Turkish ICT sector were found as availability and accessibility of telecommunications means, increased innovation capacity, enhancement of legal and regulatory framework, and increased ICT sector share in both GDP and annual export.

V. CONCLUSIONS AND FUTURE WORK

A. CONCLUSIONS

Currently, Turkey is a developing country and it needs to provide high-technology products and services in order to close the existing gap with OECD and EU economies. Clearly, wider use of information and communication technologies is a driving factor for high-technology products and services. In this information age, the path to development is creating information societies; and creating an information society needs a well-developed communications sector. Communications is essential for development of countries as it is an enabler for the development of other sectors.

The second chapter provided background to understand Turkish communications sector by examining sector history and recent developments, business environment in Turkey, major players in the sector, key statistics, and evaluation of legal framework and regulations. Then, third chapter explained the methodology used in chapter four.

The fourth chapter of this thesis has explored factors that are critical for the development and growth of the Turkish information and telecommunications sector in general, and the Turkish telecommunications sector in particular, through a detailed analysis. This analysis consisted of macro environmental analysis, micro environmental analysis, and internal analysis of Turkish telecommunications sector. PESTLE, Porter's Five Forces Model, and SWOT tools are the tools used for these analyses respectively.

Political instability and conflicts around Turkey, moderate level of economic freedom, high tax rates, corruption, non-transparency politics, current account deficit, negative trade balance of ICT sector, low GDP, skill mismatch problem, poor education system, insufficient protection for intellectual property rights, weak innovation, research, and development performance, and ineffective judicial system are determined as macro environmental problem areas against the Turkish ICT sector.

Strong ties and involvement in global economic and political organizations, increasing harmonization of legislation with EU acquis, market size of Turkey, further economic growth potential for ICT sector, young population, and increasing political

support for innovation, research, and development activities are macro environmental strengths and opportunities determined.

Micro environmental analysis revealed new fixed telephony service operators and mobile network operators as new entrants to fixed and mobile communications markets respectively. Substitution of mainstream services such as voice and text that were previously under the monopoly of telecommunications companies was identified as substitution threat against existing operators. Moreover, fixed network operators are exposed to fixed-to-mobile substitution. Power of suppliers found to be increasing in mobile telecommunications market. Local mobile network operators cooperate with foreign smartphone producers in order to increase their market positions. Power of buyers was found to be increasing too as interconnection costs decreased, coverage of small operators increased, and new alternatives such as using services of OTT providers over smartphones for international calls became available. As a result of this micro environmental analysis, competition level found to be high in Turkish telecommunications sector.

Internal analysis results indicated strengths as increasing broadband penetration rate, increasing number of businesses in ICT sector and increasing R&D funding, young population using new technologies, large ICT projects, and strong integration with the world economy, and growing market size. Weaknesses were determined as lack of global companies and brands, poor education system that cannot support innovation, high taxes imposed on ICT sector, low GDP and income level inequality, and limited capital and investments to support ICT sector.

Based on the analyses made, critical success factors are found and these are limited to five in number not to lose focus. The critical success factors for the development of the telecommunications sector include wider availability and accessibility of telecommunications means, increased innovation capacity, enhancement of legal and regulatory framework, and an increase of ICT (information and communications) sector share in GDP and in export products and services. After defining these factors, performance measures are defined for achieving these factors.

This study can be used by organizations that govern the information and communications sector of Turkey, businesses and investors planning to invest in the Turkish communications and information technology sector, other researchers who study the Turkish telecommunications sector, and by others interested in this subject for various reasons.

B. FUTURE WORK

Possible extension opportunities of this study are discussed in this section.

(1) Defining Critical Success Factors by Relative Weight

As a further extension to this study, critical success factors can be defined by questionnaires administered to people working in the telecommunications sector such as employees in network operators, owners, and employees of other companies in the communications and information sector. These questionnaires may list the results of PESTLE and SWOT analysis and ask the participants to prioritize these results on a scale in accordance with their view of relative importance and effect on development of the ICT sector. Then, CSFs can be determined based on the questionnaire results. By doing so, relative importance of each factor can be defined.

(2) Exploring Roadmaps for Achieving Critical Success Factors

Performance measures are defined for critical success factors, but exploring a deeper roadmap to achieve these critical success factors is out of scope of this thesis. A possible extension of this study can be exploring roadmaps for selected critical success factors. Questions for such a study may include one or more of the following:

- how availability and accessibility of telecommunications means can be improved in Turkey,
- how legal and regulatory framework can be improved
- how global ICT brands and companies can be established

These questions require extensive analysis. A method similar to the one followed in this thesis can be used or alternative methods or models can be developed.

(3) Examination of Smartphone Effect on Turkish Communications Sector

Smartphones have changed the communications sector deeply. The effects of smartphones on network operators, available communication means and infrastructure, information technology sector, and domestic producers can be explored. Positive and negative effects of smartphones and emerging environment can be examined and future opportunities and threats can be discussed from the perspective of domestic consumers, IT companies, and network operators.

OTT providers boomed with smartphones and they are both competing with and contributing to telecommunications companies. Questions of how telecommunications companies should react against OTT providers and how they should expand their services can be examined. This question can be asked specifically for Turkish telecommunications companies.

APPENDIX. SWOT ANALYSIS OF TURKISH TELECOMMUNICATIONS MARKET

A. STRENGTHS

- Steadily increasing broadband penetration rate
- Increasing number of businesses for designing value added services and products in ICT sector
- ICT legal framework based on EU acquis and continuous harmonization process
- Increase of e-government applications and services and strong political support for ICT sector growth
- Increasing R&D funding for ICT sector
- Developed manufacturing infrastructure for consumer electronics
- Young and dynamic population inclined to use new technologies
- Geopolitical position of Turkey – proximity to EU and Middle East markets
- Strong integration with world economy and growing market size

B. WEAKNESSES

- Limited number of companies and brands in international ICT markets
- Poor education system that cannot support innovation, high-tech industry requirements, and technical skills to meet the human resource demands of ICT sector
- High taxes imposed on ICT sector
- Insufficient cooperation in ICT market and insufficient coordination between government institutions
- Negative contribution of ICT sector to current account deficit, high import rate
- Limited capital amount for investment and lack of venture capital standards, culture, legislation, and regulatory framework

- Lack of participation of the sector in the international organizations and decision making mechanisms
- Insufficient Turkish content
- Openness of independent media regulator (RTUK) to political influence
- Lack of special courts for ICT sector and violations of intellectual property rights (IPRs), poor IPR protection and law enforcement, and high piracy rate
- Relatively low GDP and high income distribution inequality restricting access to ICT services

C. OPPORTUNITIES

- Attractive market for skilled and qualified human source
- A large and expanding market because of young population interested in new technologies and increasing population
- High interest for infrastructure investments, especially for fiber deployment
- Developing neighbor markets (Caucasus, Middle East, North Africa, Asia) bordering with Turkey on south and east
- EU accession negotiations and full membership perspective contributing to development process of the ICT sector, particularly further alignment of ICT framework with EU acquis during accession negotiations
- Low ICT sector share in GDP indicating future growth potential
- Emergence of new services that will contribute to development and growth of ICT sector
- Existence of large ICT projects like FATIH education project and e-government projects that will contribute to the development of ICT sector
- Strong development potential of e-commerce
- Potential for manufacturing ICT equipment, such as smartphones and tablets, and creation of world class brands
- Promising increase of broadband and fiber penetration rates

D. THREATS

- Continuing international political unrest, armed conflicts, and economic crises in neighboring regions and countries
- Slow e-transformation of private sector and public organizations
- Increasing cyber threats and security problems
- Digital divide, meaning inequality of people for accessing or using the ICT
- Geographical imbalance of infrastructure investments between regions
- Fast increase in demand for scarce resources such that it cannot be met in time
- Fast increase of ICT technologies versus slower change of ICT legislation
- Inefficient infrastructure investments and sharing of existing infrastructure
- Poor innovation and cooperation culture and low number of patents

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