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An Extended Overview of Information and Communication Technologies in Turkey

Hasan Tınmaz & İlker Yakın[1]

Abstract: Turkey, situated between Europe and Asia, has been developing rapidly in the last decade. Especially, technological advances have strongly affected the social and economic structure of Turkish society. Turkey's European Union harmonization process, as catalysis for the rapid developments, and digital transformation in any sector has been assisting Turkish citizens with having better lives. This paper summarizes the history of technological developments in Turkey by providing demographics on different ICT innovations. With a population of 73.7 million, Turkey has a great potential for technological infusion. Moreover, a quarter of the entire population ranges between the ages of 0 and 14. In that sense, Turkey invests so much in different ICTs for educational and economical requirements. The paper shows that although many ICTs are quite new for the country, they are highly integrated within the society; especially mobile and Internet technologies. In parallel with these advancements, the state offers many e-solutions for the citizens; such as e-government, e-tax and e-accounting applications. As the ICTs are accepted by the society, Turkish citizens have started to take advantage of many different social media found on the Internet. Especially the worldwide appreciated social networking website, Facebook, has quickly taken its part in daily lives of many Turkish people. Turkey has been announced on the top-ten list of mostly Facebook-using countries in the world. The paper provides data from well-established institutes; Turkish Statistical Institute (TUIK), Turkish Scientific and Technological Research Council (TUBITAK) and State Planning Organization (SPO). To sum up, the paper recaps the technological development history of modern Turkish Republic with a holistic approach to social changes.

Keywords: Turkey, E-government, Information and Communication Technologies, Internet Technologies, Digital Transformation, Social Media

Introduction

Latest developments in information technologies have affected the different aspects of our daily lives and sincerely altered structures of the society. As a result, modern world encounters so-called information technology reform requiring also a change in social structure and relationships among people.

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In that sense, we could forecast that information will frame the prospective societies. Thus, information technologies have a great role in all processes among people associated with design, practice and developments on the dynamics of our daily life. Simultaneously, such information technologies produce, utilize, assess and disseminate information in itself. Moreover, innovative attempts on information technologies yield another branch of science; information science, in which the effects of technologies on human beings are scrutinized. Accordingly, the emphasis on social information technology is continuously increasing for all developed and developing countries.

As a developing country, Turkey has also been influenced from the waves of information technology revolution. Turkey is a republic founded in 1923 with a rich historical past. Turkey is a so-called bridge between Asia and Europe which provide an innate power on historical, cultural and political measures. Diversity-in-Unity structure of Turkey has yielded a multicultural perspective among citizens. Furthermore, information technologies have affected each culture differently and each unique culture has also perceived the same technology differently.

Turkish Statistical Institute (TUIK), major governmental statistic association in Turkey, revealed that the population of Turkey increased to 73.7 million at the end of 2010 (TUIK, 2011a). According to the same statistics, proportion of the entire population living in Istanbul is 18% and the median age of the population in Turkey is calculated as 29.2. Approximately 25.6 percent of the entire population is between 0 and 14 ages where only 7.2 percent of the population is above 65. By considering the distribution of the population in terms of age groups, it is possible to assert that Turkey's population is highly young.

In parallel with the needs of the younger generations, the state puts more emphasis on preschool education. The number of preschooler between the ages of 3 and 5 has been increased by 22% in 2009-2010 over the preceding school year (World Bank, 2010). In 2010-2011 year, 10.981.100 students have been attending to elementary school (1-8 grades) which has been obligatory by the constitution. For this immense number of elementary students, there have been 32.797 school buildings and 503.328 teachers. After the elementary school, the students may attend secondary education. On the other hand, from the statistics, only 2.676.123 students have been attending the secondary schools in 4.102 buildings and with 118.378 teachers. At the end of the secondary school, the students must pass a difficult university entrance exam to attend the higher education. Statistics show that 3.322.559 students attend higher education in Turkey (Ministry of National Education, 2011).

Turkey is getting better in terms of its economy. According TUIK (2011b)

report, the fourth quarter (October, November and December) growth rate of GDP (gross domestic product) in 2010 compared to the same quarter of previous year increased by 9,2% in constant prices. The per capita GDP increased to 10.079 $ in 2010. The World Bank (2010) explains this success with Turkey's special focus on a vision of stable growth, a more reasonable income distribution and better global competitiveness. The World Bank (2010) also appreciates Turkey's effort on its transformation into an information society and reforms for European Union harmonization.

Information and Communication Technologies (ICTs) in Turkey
Turkish Information and Communication Technologies Authority (2010) points out that usage of mobile technologies is getting disseminated within the country. According to the widely accepted MoU (minutes of usage) ratio, average usage of mobile phones in 2010 was calculated as 218 minutes for Turkey which is more than many other developed EU countries such as England (180 minutes) and Germany (110 minutes). Moreover, a report by State Planning Organization (SPO), published in 2010, illustrated that the proportion of the mobile phone ownership in Turkey was 87,6%.

European Commission's Turkey 2010 Progress Report (2010) highlights the impressive increase in R&D expenditure which is governed by the Turkish Scientific and Technological Research Council (TUBITAK). According to the same report, R&D expenditure was increased to €310 million in 2009, from €205 million in 2008, representing a 50% increase in total. Additionally, the expenditure on research activities increased to €5.63 billion, from €5.47 billion in 2007. Although an increase has been observed in research expenditures, it is still below the target of 2013 year (2% of GDP). While total R&D expenditures were $2.9 billion in 2003, the expenditures increased sharply to $4.4 billion in 2005 (The World Bank, 2009). World Bank's Turkey National Innovation and Technology System Report (2009) provided that budget of ongoing projects rose sharply between the years of 2000 and 2006 from 13.2 million US$ to 272.7 million US$. Moreover, the same report stated further that patent applications and registrations rose by 360% from 2000 to 2005 which pointed out the second growth rate in the world. According to the same report, patent research and investigation requests by Turkish Patent Institute (TPE) increased almost three times between 2005 and 2007, from 28 to 53.

According to The World Information Technology and Service Alliance (WITSA) (2010), there is an increase in terms of total expenditures on ICT, Computer and Hardware in Turkey, as summarized in Table 1.

Table 1. Yearly expenditures on ICT, Computer and Hardware in Turkey

	Total Information and Communications Technology Spending	Total Computer Hardware Spending	Total Computer Software Spending
Year	Millions of $	Millions of $	Millions of $
2004	16,922.7	1,071.8	423.9
2005	21,017.1	1,413.7	541.2
2006	21,963.0	1,714.9	657.5
2007	24,510.8	2,011.9	783.9
2008	26,523.3	2,292.9	904.9
2009	24,167.9	2,314.2	919.2
2010	26,065.5	2,515.5	1,005.8
2011	28,404.6	2,856.8	1,157.1
2012	30,045.2	3,163.6	1,283.1
2013	31,818.4	3,503.2	1,411.9

The latest countrywide statistical studies showed that there has been a significant increase in the number of Internet users in Turkey. To explain this sudden rise regarding the number of Internet users, historical background of advances in computers and the Internet usage might elucidate educational efforts to initiate widespread usage. Although it was not until the late 1960s that some universities began to use computers, computers were used in Turkish Education System in 1984 (Akkoyunlu, 2002). Moreover, the first computer network connection was offered in co-operation with universities and TUBITAK was established in 1990 (Akkoyunlu, 2002; Usun, 2004). After Basic Education Programme carried out by World Bank was issued in 1997, information technology classrooms in 15.000 schools were set up, and also 18.000 information technology co-ordinators and 200 educational personnel were trained to elicit the support of computer literate through countrywide (Akkoyunlu, 2002).

Long-term investments for infrastructures have been proceeded with the plans throughout the country in educational system. As indicated in the report by State Planning Organization (SPO) (2010), 27,999 information technology laboratories have been established lately. Moreover, 94% of the primary and all of the Secondary schools' students have broadband Internet access at their schools. These efforts account for the fact that computer literacy and the Internet usage prevail among young generations. As the education levels

of Turkish citizens increase, their use of Internet also increases. According to the report, published by SPO in 2010 clarified that Internet usage of individuals rise in parallel with their education levels. Therefore, there seems a large linear correlation on the level of schooling and the usage of Internet in Turkey. The main motive of the Turkish Internet users is the need of communication. Besides, it was stated that Turkish citizens read online newspapers more than other countries (Cagiltay, K., Ogan, Yildiz and Cagiltay, N., 2010).

According to statistics from Nic.tr (2011), which is the administration body of '.tr' internet names' registration, number of total registered '.tr' domain is 258,301. Among entire domains, 68% is for 'com.tr' (n=176,538) where number of 'com.tr' domain was 38,214 in 2003. This shows four times increase in the number of commercial Turkish websites. Moreover, Organization for Economic Co-operation and Development (OECD), from their broadband statistics, reported that total number of fixed (wired) broadband subscriptions was 7.103.911 in December 2010 while the subscription number was 6.780.479 in June 2010(OECD, 2010). The same increase can be viewed at the total number of wireless broadband subscriptions. While the subscription number was 841.945 in June 2010, it was reached 1.458.436 in December 2010 (OECD, 2010).

Furthermore, TUIK, major governmental statistic association in Turkey, revealed that 41,6% of the Turkish houses have been provided with access to the Internet in April 2010 (TUIK, 2010a). The same statistic was measured as 30% in April 2009. While considering the former years, it can be concluded that there has been a stable increase in the number of houses with Internet connection in Turkey. ADSL (73,3%) is the most common Internet connection type in Turkey. Although computers and the Internet were used more often in the places of employment in 2004-2005, Turkish citizens' preferences have changed to be used in their home (SPO, 2010).

Demographics on Turkish Internet Users
Turkish people, aged between 16-74, use computer and Internet with the proportion of 43,2% and 41,6%, respectively. On the other hand, there observed a gender gap in using computer and Internet. While 53,4% of the men use computers, only 33,2% of the women use the computers. Additionally, 51,8% of the men access to Internet whereas 31,7% of the women utilize Internet, in Turkey (TUIK, 2010a). Indeed, both women and men whose educational backgrounds are college, university and higher education use Internet equally (SPO, 2010). Three out of five users of Internet in Turkey use the Internet every day or almost every day (TUIK, 2010a; SPO, 2010). Besides, individuals preferred to use computer and the Internet mostly at home (70%). According to the SPO (2010) report, the ratio of broadband the Internet access in households was 26,2% while the proportion of the ratio was 16,1% in 2007 and 21,9% in

2008. These ratios point out the fact that broadband technologies for Internet access are being commonly used in households in Turkey. Furthermore, the highest proportion of computer and Internet usage was in 16-24 age groups (TUIK, 2010a; SPO, 2010).

TUIK (2010a) also questioned on the most frequent activities of the users who accessed to the Internet in the period of January-March 2010. Sending and receiving e-mail with a proportion of 72,8% was revealed as the most popular action on Internet. Other mostly realized activities were listed as; posting messages to chat sites, social networking sites, blogs, news groups or online discussion forums, use of instant messaging (64,2 %), reading or downloading online news, newspapers, news magazines (58,8 %), finding information about goods or services (55,7 %), playing games or downloading files (51,2 %). Moreover, the same findings were obtained in report carried out by SPO (2009). The report illustrated that sending e-mails (72,4%), reading online news, newspapers or magazines (70,0%), sending messages to chat rooms, groups and so on (%57,8), downloading or playing games, music, films or images (56,3%), and searching information about goods and services (52,9%) were the most frequently performed activities for the use of the Internet. Turkish and European Internet users are dissimilar in many ways. A report by European Commission Joint Research Centre (JRC), published in 2010, showed that the Internet is used by 51 % of the European citizens so as to find information about goods and services. Report argues further that 33% of the citizens use the Internet for seeking health-related information whereas 31% spent on reading newspapers and magazines (JRC, 2010).

Innovation and R&D at the Enterprise-Level are also remarkable as new products were developed by more than 50% Turkish enterprises invested in R&D in 2005 (The World Bank, 2009). According to the same report, 48% of the Turkish firms initiated new products via licensing overseas technology. In the survey on 'Information and Communication Technology (ICT) usage in enterprises (TUIK, 2010b), it was disclosed that 90,9% of Turkish enterprises used the Internet. Among those enterprises, 57,8% of them have had their own websites. Furthermore, 78,1% of enterprises used the Internet for realizing banking and financial services and 28,3% of those for training and education. Related with gaining enterprises' importance, e-commerce activities, especially goods and services, ordered or purchased over the Internet have fluctuated gradually because these preferences play an active role for the purposes for the use of the Internet.

According to the SPO (2010) report, electronic devices and books, magazines, newspapers; and e-education materials have the highest level of percentage with the proportion of 32,2% and 20,8%, respectively. SPO (2010) questioned further that the major reasons for individuals why they do not prefer to shop online were that firstly, they do not need to use the Internet for shopping (72,6

%). Secondly, they do not prefer the Internet to buy goods and services due to privacy and security concerns (30,7%). In general, according to TUIK (2010a), one of the two Turkish Internet users experienced security related problems through the Internet. The same experience is valid for e-commerce activities. In 2009, 28,9 % Internet users experienced security problems with computer viruses (SPO, 2010). Although 28% of the users did not take the necessary precautions to avoid security problems; indeed, %13,9 of them did not have any information about this problem, %57,1 of the Internet users take security measures via virus scan or protection software.

Digital Transformation in Turkey

In the most of the countries, there has been an upward trend in transformation into information society since the beginning of the 1990 (OECD, 2004). Although information society policies were prioritized in the 1990s, the effort to transformation has been accelerated to join to e-Europe+ since 2001(OECD, 2004; Cayhan, 2008). After being involved in e-Europe+, transformation of Turkey into an information society projects were initiated rapidly. "e-Transformation Turkey Project" was initiated in 2003. One of the main objectives of the project was that ICT framework and policies were to be legalized so as to sustain EU standards with the principle of serving faster and better public services (Cayhan, 2008). Although different public institutions in Turkey set about the preliminary initiatives of e-applications, for instance, the Internet tax project of the Ministry of Finance and the central population management system in 1998, an integrated e-government approach was started to be used in other institutions (Cayhan, 2008). Since 2003, e-government program has been an essential part of government reform and restructuring via offering online public services to Turkish citizens (OECD, 2004). According to the same report and Medeni, Selcuk and Medeni (2010), major e-government projects are:

- E-Government Gateway (EGG)
- National Judicial Network Project (UYAP)
- Accounting Offices Automation Project (say2000i)
- Central Census Management System Project (MERNIS)
- Internet Tax Office Project (VEDOP)
- National Police Network Project (POLNET)
- Government Supply Office's Electronic Sale Project (e-Sale)
- Social Security e-Filing for Employers Project (e-Bildirge)
- Legislation Information System
- Custom Administration Modernization Project (GIMOP)

Social Media in Turkey

Flanagan (2009) recapitulates the results of comScore.com's report on the Internet and Turkey. According comScore.com, Turkey has 18.9 million Internet users who are over 15 years old. On the contrary, Flanagan (2009) uttered that an average Internet user in Turkey spend over 31 hours per month which is comparatively higher than in India with 11 hours per month with 35.0 million Indian Internet users. Likewise, Internet users in Turkey are younger than European users. For instance, 38% of the Internet users in Turkey are under the age of 24 whereas it is 26% for Europe and 28% for the entire world. Additionally, 69% of the Internet users in Turkey are under the age of 34. Therefore, it appears that Turkey has a great potential on using different Internet tools for instructional activities. Beyond that current potential, Flanagan (2009) proclaims that Turkey's online development process has not been fulfilled yet, by looking that the demographic information where 58% of the users are male with the age of 15-34 years old. Also, Flanagan (2009) adds that early adopters of the Internet related actions have been generated by young males in Turkey. Additionally it was observed that 81% of online Turkish population access to Facebook in their daily usages.

Alexa.com, which is a web information company, gives a list of top sites on the Internet. According to the list (Alexa, 2011), people from all over the world most frequently access to; Google, Facebook, Youtube, Yahoo, Blogger.com, Baidu (Chinese search engine), Wikipedia, Windows Live, Twitter, QQ.com (Chinese web portal) and MSN. According to Alexa.com, Facebook is growing fast but stable. As demonstrated by Alexa.com, Facebook is the number one website for many countries. Table 2 shows the traffic rank of Facebook in some countries. From the table, it seems that Facebook is not dominant in the countries (Brazil, Russia, and Japan) where they have their own social networking websites in their mother languages (Alexa, 2011).

Table 2. Facebook's worldwide rank for some countries, Alexa.com (June, 2011)

Country	Rank	Country	Rank	Country	Rank	Country	Rank
Indonesia	1	Egypt	2	France	2	Thailand	2
Turkey	1	South Africa	2	Greece	2	Poland	2
Malaysia	1	Belgium	2	Colombia	2	Romania	2
Philippines	1	United States	2	Sweden	2	Switzerland	2
Venezuela	1	Germany	2	Austria	2	India	3
Nigeria	1	Canada	2	Algeria	2	South Korea	3
Singapore	1	Australia	2	Bangladesh	2	Netherlands	3
Norway	1	Mexico	2	Hong Kong	2	Saudi Arabia	3
Pakistan	1	Spain	2	Chile	2	Brazil	3
Taiwan	2	United Kingdom	2	Peru	2	Russia	7
Argentina	2	Italy	2	Portugal	2	Japan	10

Alexa.com identifies top sites in Turkey in June 2011. From Table 3, Facebook is the first ranked website in Turkey while some other Web 2.0 technologies follow it (such as blogs, wikis and microblogging). As Cagiltay et al. (2010) emphasized, Turkish citizens read newspapers from their online versions.

Table 3. Top twenty websites in Turkey, Alexa.com (June, 2011)

Rank	Website	Basic Information on Website
1	Facebook.com	Social networking website
2	Google.com.tr	Search engine (Turkish version)
3	Google.com	Search engine
4	Youtube.com	Video sharing website
5	Live.com	Search engine from Microsoft.
6	Mynet.com	Web portal
7	Milliyet.com.tr	Turkish newspaper
8	Hurriyet.com.tr	Turkish newspaper
9	Sahibinden.com	Online shopping platform
10	Blogger.com	Free weblog publishing tool
11	Ekolay.net	Web portal
12	Haberturk.com	Turkish newspaper
13	Msn.com	Web portal
14	Twitter.com	Microblogging website
15	Meb.gov.tr	Website of Turkish Ministry of National Education
16	r10.net	Turkish forum website
17	Wikipedia.org	A free wiki based encyclopedia
18	Dailymotion.com	Video sharing website
19	Gittigidiyor.com	Online shopping platform
20	Sabah.com.tr	Turkish newspaper

Facebook is one of the widely used social networking web sites not only in Turkey but also in the world. Facebook offers some exclusive features and variations from the rest of the other social networking web sites. All these features of Facebook provide its users with a platform for building new relationships with people having similar interests (Vitak, 2008). Internet World Stats, which is an international website gathering data from all over the world on the Internet usage, population statistics and the Internet market research data depict the situation in Turkey (Internetworldstats, 2011). From Table 4, it seems that nearly 35 percent of the entire Turkish population becomes a member of Facebook social networking website where the percentage is three times higher than the entire world.

Table 4. Facebook in Turkey and on the World

Country	Size (sq. km.)	Population (2011 est.)	Facebook Users	Facebook Penetration
Turkey	773,473	78,785,548	27,482,720	34.9 %
World Total (Facebook)	148,429,000	6,930,055,154	664,032,460	9.6 %

According to Medina (2007), the key appealing force of Facebook stems from its social networking structure supporting connection among friends and yielding new friendships. Facebook has its own networks where some networks are regional based; like Turkey Network or some networks are like college based; Middle East Technical University Network. Kord (2008) highlights the positive effect of these networks that whenever a user registers to Facebook with its university assigned email or whenever a user joins the university network with its university provided email, that user can identify the students in the network/community both online and offline. Boogart (2006) concentrates on the developmental structure of Facebook and suggests that researchers must reflect on the practical and theoretical role of Facebook on the formation of online communities and on higher institutions of education.

Conclusion

Information and Communication Technologies are placed in heart of many daily human activities. As the people are experiencing the benefits of these ICTs, they are more opt to adapt ICTs into their lives. Any country which cannot follow the current developments in ICTs, will be at disadvantage. By becoming aware of this fact, Turkey has been transforming its fundamental elements into more digital entities. In parallel with economic developments, European Union integration processes and educational reforms, Turkey has become one of the technologically enhanced and powerful countries.

Educational reforms in terms of computer and Internet aided instruction are indispensable for Turkey which has a very young population. Therefore, the state initiated technology infusion actions at different levels of schooling from preschool education to graduate education. These actions have been realized from two broad perspectives; teaching of using these technologies and teaching of taking advantage of these technologies for instructional processes. While teachers have been taught by the institutions, younger students are learning technologies not only in schools but also in their every day routines.

As Turkish citizens are getting more technology literate, Turkey has been listed in many high ranked lists; mobile technologies minute of usage in Europe, the number of Turkish people on social networking website Facebook and etc. That shows that Turkish citizens are open to newer technologies and their integration into different stages of their lives. The state, as the main technology leading body, provides Turkish citizens with many e-government opportunities where they can manage many bureaucratic works on their personal computers.

Consequently, Turkey gives a charming impression on technology usage among other countries. In the future, Turkey will keep its place in terms of utilization of different innovations not only in consumption of technologies but also in the production of the technologies.

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