

4th Industrial Revolution and Innovating in the Digital Economy: World and Turkey Values for 2016 by Global Indicators

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Abstract: *The aim of this study is to analyze the situation between the World and Turkey's place in the world and its competitive power towards the 4th industrial revolution with the NRI global indexes data in one report on "Innovating in the Digital Economy", from The Global Information Technology (GIT) Report 2016 which has been published since 2001 and which is important in terms of management information systems. The economic strength and sustainable development of countries in the globalizing world economy depend on their competitiveness with other countries. For this reason, it is very important to measure the competitiveness of the countries. There are studies conducted by global organizations in different fields with different methods for this purpose. This study assessed the performance of the World Economic Forum (WEF), a performance analysis of the use of information technologies in the countries, using the Networked Readiness Index (NRI) data, which comparatively measures the level of countries' readiness to use Information and Communication Technologies (ICT). In the study, the theme of "Innovating in the Digital Economy", emphasizing the importance of the 4th industrial revolution and innovation, the 2016 GIT Report of the WEF was used and the NRI data were analyzed from the point of view of the World and then Turkey. In the Top 10 world rankings, Singapore, Finland, Sweden, Norway, the United States, the Netherlands, Switzerland, United Kingdom, Luxembourg and Japan are world leaders in making economic impact from their Information and Communication Technologies (ICTs) investments and are at top positions of individual usage among developed economies. All components of Turkey's NRI ranking put it on the 45th place among 144 countries of the World in 2013, the 51th place among 148 countries in 2014, the 48th place among 143 countries in 2015 and the 48th among 139 countries in 2016. In terms of NRI subindex and pillar values, Turkey is ranked 2nd among the 139 countries with the best B.Readinesssubindex at 4th pillar: Affordability. Turkey has the worst in 139 countries. A. Environmental subindex 1st pillar: Political and regulatory environment (rank: 69), B.Readinesssubindex 5th pillar: Skills (rank: 69), D.Impacts subindex 9th pillar: Economic impacts (rank: 67) and C. Usagesubindex 6th pillar: Individual usage (rank: 65). Although Turkey is very good in terms of Affordability in basic indicators, it can not provide the economic impacts for the country's economy because of the lack of skills, especially when the individual usage is low. This is due to the fact that Turkey is in the upper-middle-income group, with national income low per person, education level of the population and quality of education being low, expensive computer, tablet and mobile devices prices, very high package prices for internet and mobile internet. As a conclusion, towards the 4th industrial revolution, it is important for Turkey to take place in this revolution with information and communication Technologies; Turkey has a great potential to have Judicial independence, Quality of management schools, Quality of math&science education, Mobile phone subscriptions/100 population, Quality of education system, Number of procedures to start a business, Mobile network coverage % population and Efficiency of legal system in challenging regulations. Turkey, which wants to increase its national income, prosperity and global competitiveness, and also wants to be in the top rankings in terms of NRI, should give priority to qualified labor force, research and development, innovation, information and communication technologies by increasing the individual usage and should internalize them on the basis of personal, social and state institutions.*

Keyword: *Management Information Systems (MIS), Information and Communication Technologies (ICTs), Networked Readiness Index (NRI), innovation, 4th industrialrevolution,management*

I. INTRODUCTION

Today, on the way to the 4th industrial revolution, it is known that the countries that produce and use information and communication technologies intensively and efficiently are going to have a say in the world economies, and those who don't, would stay backwards. According to Susman and Santoz (2000:429), the information-based investments are for increasing "efficiency" and "effectiveness", and the main purpose of these investments is to accelerate the progress of these countries, as well as to increase their present welfare level.

The concept of Information and Communication Technologies (ICT) is understood as a set of components related to each other in functions of accessing, gathering, organizing, storing, distributing and implementing information (Ekinci, 2006: 55). The fact that the most advanced social level is called the "Information Society" and the economies in these societies are called "Information-based Economies", the main

reason why the increasingly non-exhaustive, even widespread knowledge constitutes the basic driving force of economic development and the strategic superiority of information. For this reason, information and communication technologies are very important in economic development of countries and have increasing significance. Countries wishing to increase global competitiveness should prioritize qualified labor, research and development, innovation, information and communication technologies, and internalize them on the basis of personal, social and governmental institutions.

The factors that determine the economic development of the countries have developed in different ways in the historical process. While the strategic element of this development in communities based on agriculture is the agricultural inputs, then physical capital in industrial societies and knowledge in information societies have become a production factor. The most productive soils and irrigation in agriculture societies, coal, oil and steel in industrial societies, technological know-how and technologically qualified labor force in information societies are the highest standards of development.

In the years when global competition has intensified and turned into different forms and we are heading towards the 4th industrial revolution, the economic development depends not only on the amount of labor, capital and natural resources but also on the progress made in innovation via information and communication technologies. For this reason, when analyzing economic development, it would be a correct approach to analyze economic factors by spreading wider perspectives and to examine their competitiveness between the countries. For this purpose, there are various studies carried out by global organizations in many fields using different methods. The performance analysis is published each year by the World Economic Forum (WEF) under the name "The Global Information Technology" , and compares the levels of the readiness to use Information and Communication Technologies (ICTs) through such global indicator as The Networked Readiness Index (NRI).

When The Global Information Technology Report (GITR) and the Networked Readiness Index (NRI) were created more than 16 years ago, the attention of decision makers was focused on how to develop strategies that would allow them to benefit from what Time Magazine had described as "*the new economy*" : a new way of organizing and managing economic activity based on the new opportunities that the Internet provided for businesses (Alexander,1983). For more than 16 years, the NRI has provided decision makers with a useful conceptual framework to evaluate the impact of ICT's at a global level and to benchmark the ICT readiness and usage of their economies (Bilbao-Osorio et al. 2014).

In this study we aimed to put forward the position of Turkey 2016 in terms of ICTs among the other countries of the world and be a guide by informing the government, enterprises and individuals to create awareness among governors, business world, executives, information world, investors, academicians and universities and be a guide for their future plans, strategies and development of executive means and tools.

The name of the GIT report for 2016, published by the WEF since 2001, has been carefully selected as "*Innovating in the Digital Economy*" and emphasized the importance of the 4th industrial revolution and innovation and the fact that future economies will be realized through innovation of the digital economy.

Innovation has been derived from the Latin word "innovatus". Innovation consists in the introduction of new products and production methods, the opening of new markets, the discovery of new raw materials and the implementation of new organizations (Schumpeter, 1934). There is a difference between invention and innovation and this difference results from its property of being able to be developed (Roberts, 1998:27).

We can evaluate innovation as follows according to its properties: Innovation is a means of competition, innovation is a system, innovation is institutional and national, innovations creates a changing and expanding effect and innovation is in interaction with all environment.

Innovation is in interaction with all environments. Innovation as a change put forward in the outputs, structure processes of an organization that facilitates its integration with the environment (Damanpour, 1996). Innovation has an important and positive relation with managerial performance (Vincent, Bharadwaj and Challagalla, 2004) and the innovative organizations grow more than those who are not innovative (Hoogstraaten, 2005).

Countries and enterprises that increase their product and service range take the lead in a competition with the others by creating a difference. They elevate their public wealth with their increased production, export, sales and personnel capacities. Moreover they create a solution to unemployment, which is one of the most important problems of the date, by creating accession. Innovation is a means of entrepreneurship and an action that provides resources to form a capacity so as to reach welfare (Drucker, 1985). Thus, countries and enterprises have to renew themselves in every aspect ceaselessly.

It is a necessity to establish the place of Turkey in innovation, correct analysis of its deficiencies and then constitution of prompt and effective innovation politics and strategies to promote it from the developing countries league to the developed countries status. Innovative ideas, products and processes are increasingly thought to be important in strengthening the competitive powers of organizations (Tiwari, 2007).

Information and Communication Technologies (ICT) are the backbone of the 4th industrial revolution. The future of the countries, the enterprises and the individuals will be more dependent on how digital technologies are embraced, how much supported and whether these technologies provide the transformation.

Countries and businesses that adopt developments in ICTs, foresee the difficulties and take a strategic approach will grow and continue their development, others will be left behind in this race.

Need of the study

Turkey is one of the production centers around the world, and even if the production capacity makes the Turkish industry attractive, in the future robots will take over the production and the need for manpower will reduce ensuring foreign companies to invest in their own countries. For this reason, our country needs to find its place in the global market developing as the center of innovation instead of the center of production. There is a tough process in front of our country, which is in the phase between the 2nd and the 3rd Industrial Revolution. In order to be able to catch up and compete with the developing technology when it is thought that we will entirely enter Industry 4.0 within 10 to 15 years, Turkey firstly must increase its individual usage and business usage, reform the education system and make economic impact from investments in ICTs, prioritize qualified workforce, innovation, research and development and internalize them on the basis of personal, social and state institutions.

II. 4TH INDUSTRIAL REVOLUTION

Today, due to information and communication technologies, economies have turned to digital economy and have come to a critical tipping point. Today, when the economy's information and communication technologies and the Internet are going to a completely different dimension, the world is talking about the revolution of the 4th century, which is now called INDUSTRY 4.0, while the 3rd Industrial Revolution has been talked about just 3-5 years ago. Industrial revolution is a term used to describe the process of starting to use machines in production. The transformation to the 4th industrial revolution is based on the substructure of the 3rd industrial revolution, which is the "digital revolution". The most important thing that distinguishes the 4th industrial revolution from the previous industrial revolutions is that the developments in information and communication technologies are at an exponential rate, that they anticipate changes in all major industrial branches and their effects on production, management and governance systems. The 4th industrial revolution, defined as the transition to new ecosystems, not only changes the economies, but also changes the production, management, governance, living, working and the way we relate to each other. The most important of these changes in the transformation of economies into information and communication technologies has been the task of management understanding and management tasks.

And, the managers have to feel the conditions of organizations, make decisions and solve problems. As in every area, there have been certain changes in the management approach; and, the companies are not managed now as before. The managers now not only manage the current situation, but also recreate the organization with new products and services. The information technologies, which is one of the tools used by today's managers to deal with change, will play a significant role in creating and delivering new products and services, re-orientation and restructuring of the organizations by the managers (Laudon & Laudon, 20).

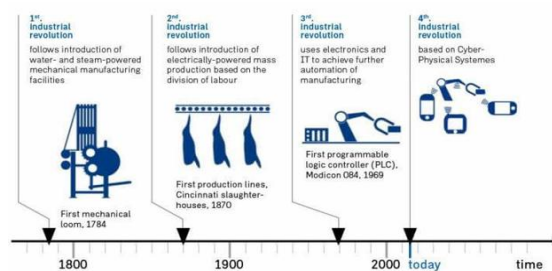


Figure1: Industrial revolutions are historical processes

(Source:<http://www.muhandisbeyinler.net/4-sanayi-devrimi-nedir/>)

Countries and companies have had to keep pace with global changes and have developed some strategies in order to maintain their competitive advantage among increasingly competitive conditions. The Industry 4.0 revolution in Germany is the name of one of these strategies. (https://en.wikipedia.org/wiki/End%C3%BCstri_4.0) Industry 4.0, or the 4th Industrial Revolution was first introduced at the Hannover Fair, Germany in 2011, announced as the German government's project to encourage the production process and to equip it with high technology. Then Robert Bosch GmbH and Henning Kagermann settled a working group for this purpose. The draft of the 4th industrial revolution prepared by the Group was presented to the German Federal Government in October, 2012. The working group presented the Industry 4.0 report again at the Hannover Fair on April 8, 2013. Today, the major race is ongoing between the United States and Germany, concerning overthrowing the Industry 3.0 era and adapting Industry 4.0 to decide who will become the pioneer country. (<http://ankaenstitusu.com/4-endustri-devrimi/>)

One of the most important issues in the Davos Economic Summit of the year 2016, which took place at the headquarters of the World Economic Forum in Davos, Geneva, Switzerland, between 20-23 January 2016,

was "Industry 4.0". Then founder and president of the World Economic Forum, Klaus Schwab in February 2016 released a book called "4th Industrial Revolution" which made a lot of noise and stated a new turning point. Although the concept "Industry 4.0" has been well-known for five years, after the publication of the book it has become one of the most important topics spoken around the world. Schwab in his book has addressed the issue of understanding and shaping the new technological revolution involving the transformation of mankind. A book also contains information on how artificial intelligence, robotics, objective internet, new technological breakthroughs such as autonomous vehicles, 3D printers, nanotechnology, biotechnology, materials science, energy storage and quantum information processing will effect people, companies, countries and the world in a surprising way in many different areas. The book presents how technology will reshape economic, social, cultural and human contexts, and thus, global and collective views and opinions.

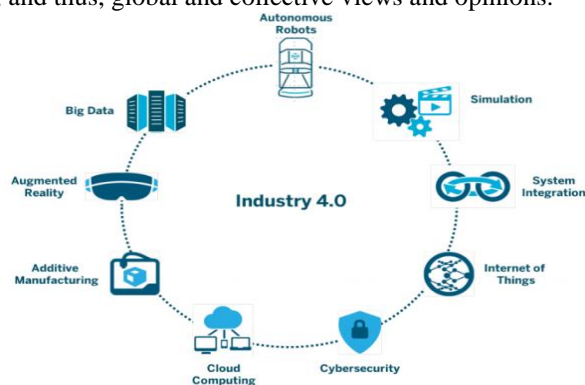


Figure 2: Nine Technological Factors That Trigger Industry 4.0

(Source: <http://www.endüstri40.com/endustri-tarihine-kisa-bir-yolculuk/>)

The main objective of the Industrial Revolution is to bring together the Information Technologies and Industry in the production of robots which are able to communicate with each other, perceive the environment with the sensors and realize the needs by making data analysis and make production that is better in quality, cheaper, faster and has less waste. It is aimed at Next Generation Software and Hardware, which will be different from today's classical hardware, will be low in cost, smaller, consume less energy, produce low heat; it will be high reliability hardware and software which are economical in terms of source and memory usage of operating and software systems. The most important component here is the Internet of Things. In short, so-called Cyber-Physical System is an intelligent electronic system with internet connection, equipped with sensors and operators, integrated into all vehicle levels, with all devices on the earth exchanging information and data with each other. In the manufacturing process, the use of cyber-physical systems in factory machines will mean 'smart factories' that can produce themselves by coordinating and optimizing themselves almost independently. If the Industry 4.0 strategy takes place, the amount of energy needed for production time, costs and manufacturing will decrease, and the quantity and quality of production will increase. (https://tr.wikipedia.org/wiki/End%C3%BCstri_4.0)

Internet technology especially due to e-commerce has changed our marketing style. The Industry 4.0 will changed the shape of production. 4.0 will unearth a new manufacturer and producer profile named "Maker Economy". The concept of "desktop production", where the production scale is smaller and where each house is a production place, will start. (<http://www.milliyet.com.tr/4-sanayi-devrimi-gundem/ydetay/2181363/default.htm>). Houses will be transformed into manufactures with multi-dimensional printers, people will be able to meet the needs of their own by using their own imagination to produce the product at home and transform the houses into a tiny factory. With the development of Industry 4.0, competition between businesses and countries will not be the result of increased production speed and product quality, but the most satisfying customer desire. The best way to determine a client's desire is to analyze data. Companies and the countries which are analyzing the mass of information created by the penetration of the internet into our life in the best way, can become superior in the global market and guarantee their future. <http://www.muhendisbeyinler.net/4-sanayi-devrimi-nedir/>. At the same time, the 4th industrial revolution will also increase competition between countries. Countries with technological manpower and smart factories that increase the production speed and quality will run their future economies.

The processing and storage capacities of the 4th industrial revolution are increasing exponentially. In the near future, information will become available to as many people as never before in human history through IP (internet protocol). In this year's Global Information Technology Report, the role of technology and broadband in particular to advance global innovation is especially emphasized. In the WEF 2016 report, as Cisco Systems Chief Executive Officer CHUCK ROBBINS pointed out, there will be over 26 billion Internet-connected devices and more than 4 billion global internet users by 2020, with data being used as new currency, exabytes of data will be migrated over IP networks. In the report it is expected to reach 1.1 zettabyte or 1 trillion gigabytes of world global IP traffic, entering the "zettabyte" period in 2016, and this figure is expected to reach

2.3 zettabytes by 2020. He also notes that this data growth will increase economies, lead to innovations and open up the waves of creativity.

Although the production speed and production capacity will increase, the costs will decrease and the developments will provide many benefits with Industry 4.0, it is inevitable that these benefits will bring along some problems. The worst of these problems is unemployment. The use of more robots in many fields of production will reduce the need for human power, and people will become unemployed. Encoding of robots made by the human brain, the beginning of designing robots that know how to code artificial intelligence will ensure that not only the labor force but also the qualified staff would be left unemployed. Germany has already announced that by the end of 2020, 53,300 people will be out of work. The 15 major German companies operating in sectors such as airlines, technology, banking, automotive, energy, pharmaceuticals and healthcare within the programs of restructuring and reducing of costs starting in 2017 will fire 53,300 employees until 2020. (http://www.ekohaber.com.tr/nesnelerin-interneti-issizlik-mi-getiriyor-haber_id-26999.html)

According to the GIT 2016 report :“The Fourth Industrial Revolution, combined with other socio-economic and demographic changes, will transform labour markets in the next five years, leading to a net loss of over 5 million jobs in 15 major developed and emerging economies” (<https://www.weforum.org/press/2016/01/five-million-jobs-by-2020-the-real-challenge-of-the-fourth-industrial-revolution/>). With Industry 4.0 many professions will disappear and new professions will emerge. Even if it is a very extreme example, it is foreseen that new professions, such as machine attorneys will appear, who will solve the disputes between the machines in the future communication. According to many authorities, the emergence of new professions in the face of the increasing world population can not be a remedy for unemployment. (<https://tasavvufvebilim.wordpress.com/2016/01/25/4-sanayi-devrimi/>)

Other problems besides unemployment are: security, threat of cyber attack, privacy problems, and the polarization of technologies in the labor market. If these negativities brought about by 4.0 will be resolved and managed well, countries and enterprises will have the potential to create innovation by creating growth and social impact, and these problems will not happen. Those who are unsuccessful in this process will probably be wiped out of the world economy over time.

Artificial intelligence, robotics and biotechnology will also change in the business world as result of the development. Klaus Schwab, founder and manager of the World Economic Forum, said that “countries where the workforce is not open to technological development will face talent shortages, mass unemployment and growing inequality, changing job areas will lead to changes in education and that 65% of children who now begin primary education will work in new job areas that have not been released yet, and it is critical to educate children for these new job areas”. (<https://www.techinside.com/teknolojiden-dolayi-5-milyon-kisi-issiz-kalacak/>). Google is already working on this and is trying to prepare young people for their future work by distributing Chromebook computers to schools and supporting their code writing trainings. (<https://www.xtrlarge.com/2016/11/21/2020-5-milyon-issiz-yapay-zeka/>)

Global Information Technology Report Vs Networked Readiness Index

Definition of the Networked Readiness Index (NRI): Networked Readiness Index is published by the World Economic Forum since 2001. In 2016 the 16th edition of this index was published, which investigates the extent of readiness of countries to use information technologies, the extent of adoption of these technologies by individuals, businesses and public administration, and the transformative effects of these technologies on the economy and society. The number of countries changes each year in the report, and the report presents the NRI values and ranks of each country.

Developed by the Forum, the NRI also determines the level of participation of a country or a society in the developments in information technology. Since the NRI reveals also the strengths and weaknesses of a country with regard to informatics, it is also possible to follow competition between countries. The Networked Readiness Index (NRI) values and the rankings based on these values in the report show the social and economic impacts, as well as the impacts on countries' competitiveness caused by the information technologies. The NRI values, ranks and income groups of 30 prominent countries calculated for the 2014 are given in the following table:

The report underlines the fact that there are limiting issues in the estimation of the index, therefore, while making comments regarding the position of countries and making comparisons, attention should be paid particularly to those social and economic peculiarities in countries like India, so as to reach proper interpretations (TUSIAD [Turkish Industry and Business Association] Sabanci University, Competition Forum, Notes, No:2012-3).

Elements of the Networked Readiness Index: World Economic Forum uses 90 indicators and variables in the calculation of the NRI. These 90 indicators and variables are reduced to 54 variables and then to 10 sub-indexes of the NRI through a statistical analysis. The networked readiness framework translates into the NRI, comprising four sub-indexes that measure the environment for ICTs; the readiness of a society to use ICTs; the actual usage of all main stakeholders; and, finally, the impacts that ICTs generate in the economy and in society. The first three sub-indexes can be regarded as the drivers that establish the conditions for the results of the

fourth sub-index, ICT impacts. The final NRI score is a simple average of the four sub-index scores, while each of the 54 sub-factor's score is a simple average of those of the composing pillars.

Calculation of the NRI: World Economic Forum uses two types of data in the calculation of the NRI. The first of these is the data set obtained from the Executive Opinion Survey prepared for the Global Competitiveness Report, and the latter is the data obtained from international institutions such as the World Bank and the International Telecommunication Union (ITU). In the report, the use of the findings obtained from the global competitiveness report indicates the importance of ICTs for competition. In the calculation of the index, the data are scored first by a 7-point scale to ensure equal distribution of each part. Then each sub-index is calculated by taking the weighted average of the related data. And, the index of the components is calculated through the same method by taking averages of the sub-indexes. Finally, the NRI is calculated by taking the average of the indexes of the four components. The NRI indices are given in the following table.

Table1: The Networked Readiness Index 2016

Environment subindex 1/2 Political and regulatory environment 1/2 Business and innovation environment	1st pillar: Political and regulatory environment	1.01 Effectiveness of law-making bodies* 1.02 Laws relating to ICTs* 1.03 Judicial independence* 1.04 Efficiency of legal system in settling disputes* 1.05 Efficiency of legal system in challenging regulations* 1.06 Intellectual property protection* 1.07 Software piracy rate, % software installed 1.08 Number of procedures to enforce a contractd 1.09 Number of days to enforce a contract
	2nd pillar: Business and innovation environment	2.01 Availability of latest technologies* 2.02 Venture capital availability* 2.03 Total tax rate, % profits 2.04 Number of days to start a businesse 2.05 Number of procedures to start a businesse 2.06 Intensity of local competition* 2.07 Tertiary education gross enrollment rate, % 2.08 Quality of management schools* 2.09 Government procurement of advanced technology products*
Readiness subindex 1/3 Infrastructure and digital content 1/3 Affordability 1/3 Skills	3rd pillar: Infrastructure and digital content	3.01 Electricity production, kWh/capita 3.02 Mobile network coverage, % population 3.03 International Internet bandwidth, kb/s per user 3.04 Secure Internet servers per million population 3.05 Accessibility of digital content*
	4th pillar: Affordability	4.01 Mobile cellular tariffs, PPP \$/min. 4.02 Fixed broadband Internet tariffs, PPP \$/month 4.03 Internet and telephony sectors competition index, 0–2 (best)
	5th pillar: Skills	5.01 Quality of educational system* 5.02 Quality of math and science education* 5.03 Secondary education gross enrollment rate, % 5.04 Adult literacy rate, %
Usage subindex 1/3 Individual usage 1/3 Business usage 1/3 Government usage	6th pillar: Individual usage	6.01 Mobile phone subscriptions per 100 population 6.02 Percentage of individuals using the Internet 6.03 Percentage of households with computer 6.04 Households with Internet access, % 6.05 Fixed broadband Internet subscriptions per 100 population 6.06 Mobile broadband Internet subscriptions per 100 population 6.07 Use of virtual social networks*
	7th pillar: Business usage	7.01 Firm-level technology absorption* 7.02 Capacity for innovation* 7.03 PCT patent applications per million population 7.04 Business-to-business Internet use*g 7.05 Business-to-consumer Internet use*g 7.06 Extent of staff training*
	8th pillar: Government usage	8.01 Importance of ICTs to government vision of the future* 8.02 Government Online Service Index, 0–1 (best) 8.03 Government success in ICT promotion*
Impact subindex	9th pillar: Economic impacts	9.01 Impact of ICTs on new services and products* 9.02 PCT ICT patent applications per million population

1/2 Economic impacts		9.03 Impact of ICTs on new organizational models*
1/2 Social impacts		9.04 Employment in knowledge-intensive activities, % Workforce
	10th pillar: Social impacts	10.01 Impact of ICTs on access to basic services*
		10.02 Internet access in schools*
		10.03 ICT use and government efficiency*
		10.04 E-Participation Index, 0–1 (best)

(Source: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf)

The asterisk (*) in the corresponding indicators is the index value of the relevant indicator value obtained by various organizations. † are the values obtained from survey questions. Some of the indicator values are those obtained from the data of national organizations.

III. MATERIALS AND METHODS

This study assessed the performance analysis of the use of information technologies in a country, performed by the World Economic Forum (WEF) and the Networked Readiness Index (NRI) data, which comparatively measures the level of countries' readiness to use Information and Communication Technologies (ICTs). The aim of this research is to investigate the state of the world and the rank of Turkey in terms of NRI in the frames of the Global Information Technology Report 2016 (Innovating in the Digital Economy) prepared by the World Economic Forum.

In the survey, first it was researched which of the World top 10 countries in the NRI indexes take what ranks in terms of ICTs. Then we compared our country with the 30 countries and their index values and world ranking values. Later, the comparison of the 7 most developed economies in the world with other world economies in terms of creating economic impacts from ICTs investment was interpreted graphically.

Then, we presented the data of all the index components including main index and subindexes to determine the location of our country in the world. Since there are many components in the NRI index, 10 subcomponents that are the best and the worst in the report were presented in tabular form. We aimed at understanding in which areas of these tables should we develop ourselves and what areas we should prioritize. From these tables it can also be easily understood what countries we should take as example in regard of our bad areas.

Acknowledgment

Previously, two different studies were conducted by the article author using NRI indexes. The first one: In 2014, the explanatory rates of NRI components in relation to countries' income groups and the income groups of these components were investigated. The results of this study are published in the "Information and Knowledge Management" magazine in the 5th (1) issue between pages 112-132 under the heading "The Income Groups of Countries: An Approach of Management Information Systems Via Networked Readiness Index". You can see the work at <http://www.iiste.org/Journals/index.php/IKM/article/view/19456>.

The second study was the investigation of the Turkish values of NRI components between 2012 and 2015 years. This study was presented on the 6-8th of October 2016 in Izmir / Turkey during the "3rd International Management Information Systems Conference" as a work titled "The Place of Turkey in the World in terms of Global Information Technologies and Comparison of Turkey's AHE Values between 2012 and 2015". You can reach this work in Conference proceeding pp.292-304 at <http://ybs.deu.edu.tr/wp-content/uploads/2016/10/BildirilerKitap.pdf>. This work is a completely different work from the other two.

Limitations

The results obtained in this study are summarized and interpreted in tables and graphics because of the large number of indicators. Because each value can not be interpreted individually, the tables and graphics can provide comments one requires.

Directions for Future Research

The findings from our study have significant meanings for governments, decision makers, public organizations, private sector businesses, managers, educators, social scientists, universities and researchers. The ruling administration in every field of Turkey should give priority to ICTs and innovation. The findings obtained from this study should be examined and interpreted by governments, economists, managers, educators and sociologists considering the qualities of the relevant year.

IV. RESULTS

Global Information Technology Report 2016 assesses the factors, policies and institutions that make full use of information and communication technologies (ICTs) that increase the prosperity and competitiveness of an individual in some country. The report also examines the role of information and communication technology (ICT) in driving innovation through the theme of Innovations in the Digital Economy.

For each of the 139 economies covered in the report, ICTs are allowed to be used more effectively for socio-economic development, with priority areas of the economies being identified. Four important messages have emerged in this year's report.

1. Innovation is being increasingly based on digital technologies and business models, and if it is smartly oriented, economic and social benefits will be gained from ICTs.
2. The ways in which businesses adopt ICTs are the key to using them for development; so, it should be the priority of governments to encourage businesses to fully embrace the power of digital technology.
3. Both the private sector and governments need to accelerate their efforts to invest in innovative digital solutions to direct social impact.
4. A sustainable digital economy will depend on rapidly evolving governance frameworks that enable societies to anticipate and shape the impact of emerging technologies and react quickly to changing conditions.

Below given the information about the rank and the country's belonging to the income group, NRI value of the 30 countries thought to be important from these values calculated for the year 2016.

Table1: The Networked Readiness Index 2016 Top 10 and some countries values and ranks are as follows.

Rank	Country	Value	Income Group	Rank	Country	Value	Income Group
1	Singapore	6.00	High income	16	Iceland	5.5	High income:OECD
2	Finland	6.00	Highincome:OECD	17	New Zealand	5.5	High income:OECD
3	Sweden	5.8	High income:OECD	18	Australia	5.5	High income:OECD
4	Norway	5.8	High income:OECD	19	Taiwan, China	5.5	High income
5	US of America	5.8	High income:OECD	21	Israel	5.4	Highincome:OECD
6	Netherland	5.8	High income:OECD	24	France	5.3	High income:OECD
7	Switzerland	5.8	High income:OECD	26	Un.Arab Emir.	5.3	High income
8	Un.Kingdom	5.7	Highincome:OECD	35	Spain	4.8	High income:OECD
9	Luxembourg	5.7	High income:OECD	41	Russian Fed.	4.5	High income
10	Japan	5.6	High income:OECD	45	Italy	4.4	High income:OECD
11	Denmark	5.6	High income:OECD	48	Turkey	4.4	Upper middle income
12	Hong Kong	5.6	High income	59	China	4.2	Upper middle income
13	Korea Rep.	5.6	Highincome:OECD	62	Thailand	4.2	Upper middle income
14	Canada	5.6	High income:OECD	70	Greece	4.1	High income:OECD
15	Germany	5.6	High income:OECD	91	India	3,8	Lower middle income

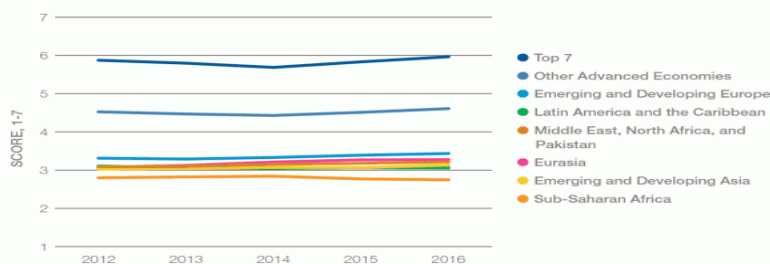
(Source: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf)

The countries in the top 10 list and their best spheres are listed on the WEF website as follows:

(Source : <http://reports.weforum.org/global-information-technology-report-2016/>)

1. Singapore(6.04) : Has the highest mobile phone penetration at 148%, top of the Networked Readiness Index for the second year in a row.
2. Finlandiya (5.96) : The best country in the world for education and skills according to the World Economic Forum's Human Capital Report.
3. Sweden (5.85) : Stockholm is the second most prolific technology hub on a per capita basis, behind Silicon Valley
4. Norway (5.83) : Has the world's second-fastest average internet speed -21.3Mb/s vs South Korea's 29.0Mb/s
5. United States of America (5.82) : Home to seven of the world's ten largest tech companies.
6. Netherlands (5.81) : In July 2016, became the first country with a nationwide network dedicated to internet things ülkesi.
7. Switzerland (5.75) : Ranks second out of ten European countries with the largest data centres by surface area per capita
8. United Kingdom (5.72) : Home to 17 tech "unicorns" – companies valued at more than \$1 billion.
9. Luxemburg (5.67) : Has the highest skilled workforce in the world with 60% of people in high skilled jobs.
10. Japan (5.65) : Japan's car industry has the world's highest robot density, with nearly 1.5 robots for every 10 human employees.

Graph1: Where are ICTs having the strongest economic impact?



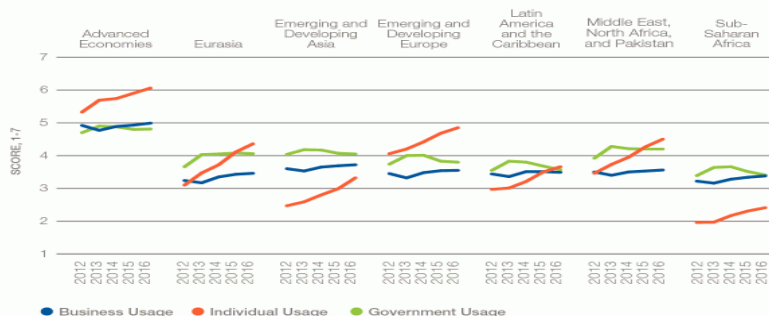
Source: World Economic Forum, NRI data
Note: Numbers based on a constant sample of 127 economies.

(Source : http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf)

According to the World Economic Forum's Global Information Technology Report 2016, Top 7 countries, Finland, Switzerland, Sweden, Israel, Singapore, the Netherlands and the United States are world leaders in creating economic impact from investments in information and communications technology (ICT). As Graphic-1 in the GIT report clearly shows, these Top 7 countries are: 33% more forward than other developed economies, and 100% more than undeveloped and developing countries. These countries are countries that adopted ICTs early.

Graph2: Numbers based on a constant sample of 127 countries economies.

Kaynak : http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf



Source: World Economic Forum, NRI data
Note: Numbers based on a constant sample of 127 economies.

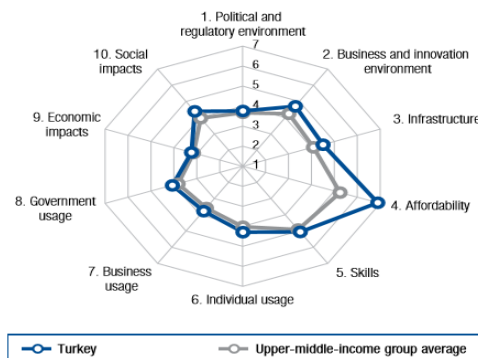
When we look at ICTs usage, as shown in Graphic-2, individual usage is higher in advanced economies. Then comes the business usage and finally the government usage. In terms of ICTs in Emerging and Developing Europe and in Sub-Saharan Africa this situation is exactly the opposite. The most there is government usage, then business usage and lowest value is individual usage. This graphic shows us how important individual usage is.

Figure3: NRI 2016 Turkey Values

Source : http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf

Turkey

	Rank (out of 139)	Value (1-7)
Networked Readiness Index	48	4.4
Networked Readiness Index 2015 (out of 143).....	48.....	4.4
Networked Readiness Index 2014 (out of 148).....	51.....	4.3
Networked Readiness Index 2013 (out of 144).....	45.....	4.2
A. Environment subindex	49	4.2
1st pillar: Political and regulatory environment.....	69.....	3.8
2nd pillar: Business and innovation environment.....	43.....	4.7
B. Readiness subindex	40	5.5
3rd pillar: Infrastructure.....	59.....	4.5
4th pillar: Affordability.....	2.....	6.9
5th pillar: Skills.....	69.....	5.0
C. Usage subindex	59	4.0
6th pillar: Individual usage.....	65.....	4.3
7th pillar: Business usage.....	56.....	3.8
8th pillar: Government usage.....	57.....	4.1
D. Impact subindex	58	3.8
9th pillar: Economic impacts.....	67.....	3.2
10th pillar: Social impacts.....	54.....	4.4



In terms of Networked Readiness Index ranking, Turkey is ranked 45th among 144 countries of the world in 2013, 51th among 148 countries in 2014, 48th among 143 countries in 2015 and 48th among 139 countries in 2016. We see that the ranking of Turkey in 2016 remained the same as the previous year, which was also 48 in 2015. But when we had 143 countries in 2015, and 139 in 2016, the number of the countries reduced, we can assume that the ranking of Turkey is going through a decrease in 2016.

When we evaluate Turkey according to its rankings in terms of NRI subindex and pillar values, we get the following results: Turkey is ranked 2nd among the 139 countries with the best B.Readinesssubindex 4th pillar: Affordability. In the negative ranking Turkey among 139 countries has A. Environmental subindex 1st pillar: Political and regulatory environment (rank: 69), B.Readinesssubindex 5th pillar: Skills (rank: 69), D.Impactsubindex 9th pillar: Economic impacts(rank : 67) and C.Usagesubindex 6th pillar: Individual usage (rank: 65).

Although Turkey is very good in terms of Affordability in terms of basic indicators, it can not provide the economic impacts for the country's economy because of the lack of skills, especially when the individual usage is low. This is due to the fact that Turkey is in the upper-middle-income group, with national income low

per person, education level of the population and quality of education being low, expensive computer, tablet and mobile devices prices, very high package prices for internet and mobile internet.

As a country, we must first increase individual use, because the growth of individual use increases the economic development.

Figure3: NRI 2016 Turkey Values

Source : http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf

The Networked Readiness Index in detail

INDICATOR	RANK/139	VALUE	INDICATOR	RANK/139	VALUE
1st pillar: Political and regulatory environment			6th pillar: Individual usage		
1.01 Effectiveness of law-making bodies*	53	4.0	6.01 Mobile phone subscriptions/100 pop.	102	94.8
1.02 Laws relating to ICTs*	48	4.3	6.02 Individuals using Internet, %	67	51.0
1.03 Judicial independence*	107	3.0	6.03 Households w/ personal computer, %	59	56.0
1.04 Efficiency of legal system in settling disputes*	76	3.5	6.04 Households w/ Internet access, %	51	60.2
1.05 Efficiency of legal system in challenging regs*	90	3.2	6.05 Fixed broadband Internet subs/100 pop.	62	11.7
1.06 Intellectual property protection*	82	3.7	6.06 Mobile broadband subs/100 pop.	69	42.7
1.07 Software piracy rate, % software installed	53	60	6.07 Use of virtual social networks*	49	5.8
1.08 No. procedures to enforce a contract	48	35	7th pillar: Business usage		
1.09 No. days to enforce a contract	80	580	7.01 Firm-level technology absorption*	36	5.2
2nd pillar: Business and innovation environment			7.02 Capacity for innovation*	83	3.8
2.01 Availability of latest technologies*	55	5.0	7.03 PCT patents, applications/million pop.	40	9.0
2.02 Venture capital availability*	93	2.5	7.04 ICT use for business-to-business transactions*	47	5.0
2.03 Total tax rate, % profits	84	40.9	7.05 Business-to-consumer Internet use*	49	4.8
2.04 No. days to start a business	46	8	7.06 Extent of staff training*	102	3.6
2.05 No. procedures to start a business	92	8	8th pillar: Government usage		
2.06 Intensity of local competition*	10	5.9	8.01 Importance of ICTs to gov't vision*	73	3.9
2.07 Tertiary education gross enrollment rate, %	17	79.0	8.02 Government Online Service Index, 0-1 (best)	53	0.56
2.08 Quality of management schools*	106	3.7	8.03 Gov't success in ICT promotion*	73	4.0
2.09 Gov't procurement of advanced tech*	39	3.7	9th pillar: Economic impacts		
3rd pillar: Infrastructure			9.01 Impact of ICTs on business models*	52	4.7
3.01 Electricity production, kWh/capita	62	3201.6	9.02 ICT PCT patents, applications/million pop.	46	1.7
3.02 Mobile network coverage, % pop.	90	98.0	9.03 Impact of ICTs on organizational models*	69	4.1
3.03 Int'l Internet bandwidth, kb/s per user	61	42.9	9.04 Knowledge-intensive jobs, % workforce	72	19.7
3.04 Secure Internet servers/million pop.	59	57.3	10th pillar: Social impacts		
4th pillar: Affordability			10.01 Impact of ICTs on access to basic services*	46	4.7
4.01 Prepaid mobile cellular tariffs, PPP \$/min	22	0.10	10.02 Internet access in schools*	62	4.4
4.02 Fixed broadband Internet tariffs, PPP \$/month	17	19.10	10.03 ICT use & gov't efficiency*	43	4.5
4.03 Internet & telephony competition, 0-2 (best)	1	2.00	10.04 E-Participation Index, 0-1 (best)	64	0.49
5th pillar: Skills			Note: Indicators followed by an asterisk (*) are measured on a 1-to-7 (best) scale. For further details and explanation, please refer to the section "How to Read the Country/Economy Profiles" on page 53.		
5.01 Quality of education system*	92	3.3			
5.02 Quality of math & science education*	103	3.3			
5.03 Secondary education gross enrollment rate, %	13	114.6			
5.04 Adult literacy rate, %	50	95.0			

Table2: 10 values that Turkey is the best in the world

(Source: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf)

SN	INDICATOR	RANK	VALUE
1	4.03 Internet & telephony competition, 0-2 (best)	1	2.0
2	2.06 Intensity of local competition	10	5.9
3	5.03 Secondary education gross enrollment rate, %	13	114.6
4	2.07 Tertiary education gross enrollment rate %	17	79.0
5	4.02 Fixed broadband internet tariffs, PPP \$/month	17	19.10
6	4.01 Prepaid mobile cellular tariffs, PPP \$/min	22	0.10
7	7.01 Firm-level technology absorption	36	5.2
8	2.09 Government procurement of advanced tech	39	3.7
9	7.03 PCT patents, applications/million pop	40	9.0
10	10.03 ICT use & government efficiency	43	4.5

When we look at the top 10 values, we can see the following: Environment subindex 1st pillar: Political and regulatory environment, Readiness subindex 3rd pillar: Infrastructure and digital content, Usage subindex 6th pillar: Individual usage and 8th pillar: Government usage and impacts subindex 9th pillar: Economic impacts were not included in the best rankings in terms of indicators.

When we look at the top 10 values, Turkey is in good condition in terms of all the indicators in the 4.th pillar: Affordability in the Readiness subindex, and all the subcomponents of these indicators are among the 10 indicators that are the best in Turkey. Among them, 4.03 Internet & telephony competition ranked 1st in the world rankings with 0-2 (best), Turkey ranked 1st in the best rankings, 4.02 Fixed broadband internet tariffs, PPP \$ / month ranked 17th in the world rankings, Turkey ranked 5th in the best rankings and 4.01 in prepaid mobile cellular tariffs, PPP \$ / min with 22nd place in the world rankings, Turkey is the 6th place in the best ranking. From here we see that Turkey has solved its problems in accessibility.

When we look at the top 10 value lists, Environment subindex is in 2nd pillar: It ranked among the top 10 with only 3 indicators out of 9 indicators of business and innovation environment. These indicators are 2.06 Intensity of local competition with 10th place in the world rankings, and Turkey is on the 2nd place in the best rankings, 2.07 of Tertiary education gross enrollment rate% with 17th rank in the world rankings, Turkey has the 4th rank in the best rankings and finally 2.09 Gov't procurement of advanced tech with the 39th place in the world rank, Turkey is the 8th place in the best order.

When we look at the top 10 value orders, only one of the 4 indicators of Readiness subindex 5th pillar: Skills is in the top 10. This indicator is ranked 17th in the world rankings with 5.03 Secondary education gross enrollment rate,%, Turkey ranked 3rd in the best rankings.

If looking at the top 10 value lists, only two, the Usage subindex 's 7th pillar: Business usage' s 6th are in the top 10. With 7.01 firm-level technology absorption, Turkey ranks 36th in the world rankings, Turkey is the 7th rank in the best rankings, 7.03 PCT patents, 40th in the world rankings with applications / million pops, Turkey ranked 9th in the best rankings. Although the indicator is within the top 10 in Turkey, the 40th place in 139 countries is not good at all. For this reason, it is not true if we say that we are in a good place in the world in terms of business impact.

When we look at the top 10 value lists, Impact subindex in 10th pillar: Social impacts, only one of the 4 indicators is in the top 10. This is the 43rd place in the world rank with 10.03 ICT use & government efficiency, and Turkey ranks 10th in the best rankings. Although the indicator is in the first 10 in Turkey, the ranking in the 139 countries is not good at all. For this reason, it is obvious that we are not good in terms of social impact.

As a result, we can say that Turkey has no Affordability problem, has new technologies, but does not internalize in terms of individual usage, business usage and government usage, and does not internalize the effects of economic impact and social impact. We can list the reasons for the bad effect of individual usage as national income per person, minimum wage, education level of population, low quality of education, computer, tablet and mobile devices purchase prices, internet, mobile internet packages prices. We are the best in the field of Readiness subindex 4th pillar: Affordability and Environment subindex and 2nd pillar: Business and innovation environment.

Table3: 10 values that Turkey is the worst in the world

(Source: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf)

SN	INDICATOR	RANK	VALUE
1	1.03 Judicial independence	107	3.0
2	2.08 Quality of management schools	106	3.7
3	5.02 Quality of math&science education	103	3.3
4	6.01 Mobile phone subscriptions/100 pop.	102	94.8
5	7.06 Extend of staff training	102	3.6
6	2.02 Venture capital availability	93	2.5
7	5.01 Quality of education system	92	3.3
8	2.05 Number of procedures to start a business	92	8
9	3.02 Mobile network coverage %pop	90	98.0
10	1.05 Efficiency of legal system in challenging regs.	90	3.2

When we look at the worst 10 value rankings: Turkey`s Usage subindex 8th pillar: Government usage, impact subindex 9th pillar: Economic impacts and 10th pillar: Social impacts, which are not being the worst values.

The worst 10 value rankings: 1st pillar in the Turkey Environment subindex: Political and regulatory environment indicators; 1.03 Judicial independence which is 107th among 139 countries in the world ranking, Turkey's worst rank 1st place and 1.05 Efficiency of legal system in challenging regulations is 90th In the world rankings, Turkey is the 10th rank with the worst rankings. Turkey must urgently solve the problems of Judicial independence and Efficiency of legal system in challenging regulations which is very bad in terms of world ranking.

When we look at the worst 10 value orders, Environment subindex 2nd pillar: Business and innovation environment is in the worst 10 with 3 indications out of 9 indicators. These indicators are 2.08 Quality of management schools with 106th rank in the world, Turkey on the 2nd place with worst rank, 2.02 Venture capital availability with 93rd rank, Turkey with worst 6th rank and finally 2.05 Number of procedures to start a Business Turkey is in the 8th place in the worst order in the world rankings.

When looking at the worst 10 value ranks, Readiness subindex 's 3rd pillar: Infrastructure and digital content, is one of the 5 indicators in the last 10. This indicator is ranked 90th in the world rank with 3.02 Mobile network coverage% pop, 9th rank in the worst rank in Turkey.

In the worst 10 value order, Readiness subindex 5th pillar: Skills, two out of 4 indications of are in the last 10. This indicator is ranked 103rd in the world rankings with 5.02 Quality of math & science education, 92nd rank in the world rank with the 3rd rank in Turkey's worst rank and 5.01 Quality of education system and 7th rank in the worst rank in Turkey.

When we look at the worst 10 value order, Usage subindex 's 6th pillar: Individual usage with only one of 7 indicator is in the last 10. This 6.01 Mobile phone subscriptions / 100 pop. with 102 place in the world rank, Turkey ranks 4th in the worst order. Usage subindex 's 7th pillar: Business usage, only one of the 6 indicators is in the last 10. It is ranked 102nd in the world rank with 7.06 Extend of staff training, and 5th rank in the worst rank in Turkey.

As a result, we can say the following: Judicial independence is one of the urgent problems in Turkey that needs to be resolved in terms of NRI indexes. Then comes Quality of management schools, Quality of math & science education, Quality of education system. From these indicators, we see that Turkey has serious problems in education system from primary education to tertiary education and that education reforms are required to solve them. For the solution, education systems of the countries which are very good in education, especially Finland, can be adapted to our country by taking the countries from the GIT report. One more of the Turkey`s problems that has to be solved urgently is Efficiency of legal system in challenging regulations.

Interms of ICTs, we see that there is no Affordability problem, we have new technologies, but we can not internalize it on the basis of individual usage, business usage and government usage and we can see that there is no economic impact and social impact effects. We can list the reasons for the bad effect of individual usage as national income per person, minimum wage, education level of population, low quality of education, computer, tablet and mobile devices prices, internet, mobile internet packages prices. We are the best in the field of Readiness subindex in 4th pillar: Affordability and Environment subindex in 2nd pillar: Business and innovation environment.

V. CONCLUSION AND DISCUSSION

Progress in the technology and informatics continue to increase at a dazzling speed each passing day and affect us in every area of life. The internet and information technologies have made our world smaller, globalized and removed the boundaries between countries in competition. Not money or natural sources but the information technology has become the most important competitive factor in businesses, as the world globalizes rapidly. Information technologies are formal information systems that utilize various sources to collect, process, store and report the information necessary for managers to make decisions (Tekin et al., 2000: 83). According to Nomura, the information systems owned by businesses have become one of the traditional business resources such as land and capital (Nomura,2002:263-278), and these systems are now the backbone of modern business enterprises (Collier, 2009: 148).

NRI is a performance analysis on the use of information technologies in a country and hence is a strong index that comparatively measures level of readiness of countries to use Information and Communication Technologies (ICTs). The first data set, which was obtained from the findings from the Executive Opinion Survey prepared for the Global Competitiveness Report, shows the importance of the NRI in the competition between countries in terms of the ICTs. Although it has no direct economic items, it has very good sub-items in explaining the income groups of countries.

In order to increase the income-levels of countries, it is very important for governments to know how to benefit from the NRI, which is a performance analysis on the use of information technologies in a country and hence is a strong index that comparatively measures level of preparedness of countries to use Information and Communication Technologies (ICTs). According to the results of the study, the countries need to plan their priority NRI factors well to raise their income groups, improve their competitiveness and welfare. Considering the numerous indexes in the literature, we think that the policy makers of the countries, senior managers of businesses, leading IT specialists shaping the IT industry and management information systems specialists need to analyze the NRI well.

Our expectations from the results of this study are to reveal the NRI status of Turkey, to inform governments, businesses and individuals and create awareness for governments, business world, administrators, informatics specialists, investors, educators and universities, to guide them in developing future plans, strategies and administrative tools. For each indicator, the realized position of Turkey was found; solution proposals were given for the strengthening, weakening and no progress indicators of the country. As there were many indicators in the NRI Index, results were not separately interpreted for each indicator. For the results of the study, Table 10 should be examined and interpreted very well.

In the Top 10 world rankings, Singapore, Finland, Sweden, Norway, the United States, the Netherlands, Switzerland, United Kingdom, Luxembourg and Japan are world leaders in making economic impact from their

Information and Communication Technologies (ICTs) investments and are at top positions of individual usage among developed economies. All components of Turkey's NRI ranking put it on the 45th place among 144 countries of the World in 2013, the 51th place among 148 countries in 2014, the 48th place among 143 countries in 2015 and the 48th among 139 countries in 2016. In terms of NRI subindex and pillar values, Turkey is ranked 2nd among the 139 countries with the best B.Readinesssubindex at 4th pillar: Affordability. Turkey has the worst in 139 countries. A. Environmental subindex 1st pillar: Political and regulatory environment (rank: 69), B.Readinesssubindex 5th pillar: Skills (rank: 69), D.Impactsubindex 9th pillar: Economic impacts (rank: 67) and C.Usagesubindex 6th pillar: Individual usage (rank: 65). Although Turkey is very good in terms of Affordability in basic indicators, it can not provide the economic impacts for the country's economy because of the lack of skills, especially when the individual usage is low. This is due to the fact that Turkey is in the upper-middle-income group, with national income low per person, education level of the population and quality of education being low, expensive computer, tablet and mobile devices prices, very high package prices for internet and mobile internet.

As a conclusion, towards the 4th industrial revolution, it is important for Turkey to take place in this revolution with information and communication Technologies; Turkey has a great potential to have Judicial independence, Quality of management schools, Quality of math&science education, Mobile phone subscriptions/100 population, Quality of education system, Number of procedures to start a business, Mobile network coverage % population and Efficiency of legal system in challenging regulations. Turkey, which wants to increase its national income, prosperity and global competitiveness, and also wants to be in the top rankings in terms of NRI, should give priority to qualified labor force, research and development, innovation, information and communication technologies by increasing the individual usage and should internalize them on the basis of personal, social and state institutions.

Turkey needs the miracle of innovation to move from the group of developing countries to the group of developed one, to step forward and to have its voices in global competition. Benefitting from innovations by developing countries will be faster and more effective compared to developed countries. Turkey has not reached to the point of satisfaction with respect to innovation. It has advantages regarding population considering the fact that the population would have an excessive impact (Alakoç Burma, Z., 2015, 80).

The findings from our study have significant meanings for governments, decision makers, public organizations, private sector businesses, managers, educators, social scientists, universities and researchers. The ruling administration in every field of Turkey should give priority to innovation. The findings obtained from this study should be examined and interpreted by governments, economists, managers, educators and sociologists considering the qualities of the relevant year.

When Turkey becomes innovative, it will increase its variety of product and service and be distinguished among other countries which will increase its production, export, national income, social welfare and employment. Turkey needs to determine its own innovation strategies according to its priorities and it should determine in its development plans the methods and results to follow in achieving these goals. In this difficult and compulsory process, governments, public institutions, universities, managers, industry, technology and individuals should adopt and support innovation and participate in the process.

Turkey is one of the production centers around the world, and even if the production capacity makes the Turkish industry attractive, in the future robots will take over the production and the need for manpower will reduce ensuring foreign companies to invest in their own countries. For this reason, our country needs to find its place in the global market developing as the center of innovation instead of the center of production. There is a tough process in front of our country, which is in the phase between the 2nd and the 3rd Industrial Revolution. In order to be able to catch up and compete with the developing technology when it is thought that we will entirely enter Industry 4.0 within 10 to 15 years, Turkey firstly must increase its individual usage and business usage, reform the education system and make economic impact from investments in ICTs, prioritize qualified workforce, innovation, research and development and internalize them on the basis of personal, social and state institutions.

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