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INDUSTRY 4.0 AND COMPETITIVENESS

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ABSTRACT

Purpose- Recent developments in information technology lead to a new industrial revolution, transforms the entire eco-system. The last industrial revolution of the information society is referred to as Industry 4.0. This paper tries to explain fourth industrial revolution with its basic concepts and draws attention to dramatic changes in the production systems and competition environment in the World and Turkey.
Methodology- This paper used a qualitative method, present and discussed the opportunities and challenges in implementation of Industry 4.0 especially in terms of competitiveness.
Findings- Industry 4.0 have a substantial potential to change global competition environment and can be seen as a great opportunity Turkey's development and improvement in competitiveness, although the state of preparations for its implementation are very limited for now.
Conclusion- The present study contributes the Industry 4.0 literature by drawing attention to its relationship between competitiveness.

Keywords: Industry 4.0, competitiveness, innovation, technology, production systems.
JEL Codes: O14, 025, 030

1. INTRODUCTION

In recent years, growing implementation of digital technologies to manufacturing process lead a new industrial revolution concept to have emerged. The term “Industry 4.0” has become an increasingly important discussion topic in the last few years.

Industrial revolutions have emerged as the periods in which technological progress and productivity in production gained high momentum in historical process. Throughout history, three industrial revolutions took place. The first industrial revolution (Industry 1.0) started at the end of the 18th century when James Watt discovered the steam engine, using steam-powered machines in the production (weaving looms) and the establishment of mechanical production facilities. In second industrial revolution (Industry 2.0), production efficiency has increased with the widespread use of oil and the development of production line systems. The third industrial revolution (Industry 3.0) has emerged as an informatic revolution with the rapid development of electricity, electronics, computers and the Internet. The last industrial revolution of the information society is referred to as Industry 4.0.(EBSO, 2015)

Industry 4.0 can be defined as the ability of machines to be able to manage production processes by replacing manpower. The new industrial revolution is the era of technological change in production, cyber- physical production techniques and smart factories. This revolution, which is expected to happen at any moment, points out to the organization of all production equipment integrated into a network, from the idea to delivery stage to the final consumer, including the after-sales services, self-management and the adaptation of a new organization and management model.This whole process emerged as the elements that increase competitiveness.

In this paper, we discuss about industry 4.0 with the new concepts it's brought to our lives and draw attention paradigm changes in the production system and to the effects of this changes on economy in terms of competitiveness

2. INDUSTRY 4.0

Industry 4.0 was conceptually mentioned for the first time in 2011 at the Hannover Fair in Germany. It was stated by experts who participated in the fair that the information era started a new period in the production processes and a new Industrial Revolution was taking place.(EBSO, 2015) The development of a new economic concept based on advanced technology strategies has been proposed as an offer.(Roblek et al., 2016)

The 4th Industrial Revolution has gained a formal qualification, with the Government of Germany taking these views as a new industrial strategy. Indeed, the German government's Industry 4.0 project "High-Tech Strategy" launched in 2011, transformed into a research agenda in 2013.(Roblek et al., 2016)

The effects of Industry 4.0 on the business world are defined in three main areas. These are integration and digitalization of vertical and horizontal value chains, digitalization of products and services, creation of a digital business model and customer relations.(PWC,2016)

Since the beginning of the 21st century, it has been observed that there has been a digital transformation in every area of life. In particular, recent developments in information technology lead to a new industrial revolution, transforms the entire eco-system. Unlike its predecessors, the Industrial Revolution is regarded as the beginning of a process that affects every aspect of life, which has many implications for the modern life and influences the way of doing business. Indeed, innovations in digital technology alter our relationship with environment and objects also the way we percept them permanently.

Digitalization is a phenomenon that connects people and things with the help of information and communication technologies and convergence real and virtual worlds. Indeed, the process of digitization has accelerated rapidly in recent years. This trend transforms the entire infrastructure in areas such as energy, transportation, health manufacturing.(Kagermann, 2015) Of course it also transforms goods and services production patterns.

At this point, traditional production systems are in a transformation towards digitalization with increasing technological innovations. This digital transformation is triggered by new technologies such as intelligent robots, cyber physical systems, sensors, 3d printing, cloud systems, the internet of objects, big data and so on. These new technologies lead to a new era in manufacturing by creating a new production environment that is integrated with the physical and the virtual.

Industry 4.0 can be defined as a revolution in the production process with advanced information technologies and automation applications, bring new values and services for the customers and organization itself.(Khan, Turowski, 2016) Industry 4.0 as a new production system implys that without the need for manpower machines has the ability to manage the entire production process.(EBSO, 2015)

The notion behind Industry 4.0 is the introduction of information and internet technologies to industry. Industry 4.0, which has Cyber Physical Systems (SFS) and the Internet of Things in its base, is constructed as a system that combines the physical with the virtual. This system consist with full integrated machines that provide mutual information flow continuosly. These machines are programmed with the ability to manage and optimize the production in a way that minimizes errors and faults in the production processes by providing coordination, either side to people or independent.

Industry 4.0 expresses an integrated industry vision to be implemented via computer, software and internet technologies. In this context, Industry 4.0 vision represents a digital revolution in production, where a new production order, high efficiency, self-governing smart factories, all equipment, machines, and all components in the production process communicate and cooperate with each other. Furthermore, this vision is designed to include all stages of a product's value chain, from the initial idea stage of the product to engineering, production, usage and recycling stages.(Lydon, 2016)

There are new technologies which makes industry 4.0 possible and will shape the industry production. These; Intelligent robots, simulation, horizontal-vertical software integration, Internet of Things, cyber security, cloud technologies, additive production, augmented reality, big data analysis .(TUSİAD, 2016) These new technologies, which make Industry 4.0 possible and some of them started to be implemented in a small scale in industrial production, point out to the era of decreasing costs and increasing productivity during the production process.

2.1. Technological Concepts of Industry 4.0

In order to reveal Industry 4.0 effects, technological factors, which are used, are decisive. The fourth industrial revolution is shaped by the Internet of things, smart factories, cyber physical systems, big data, smart robots, simulation, horizontal and vertical integrations, cloud computing system, cyber security, additive manufacturing and augmented reality.

2.1.1 Internet of Things (IoT)

As a most important and influential invention of history, internet, already influenced many areas of our lives permanently. Major impact of internet can be seen on education, communication, work, health, environment, economy, etc. Internet of things can be seen as the next step in the evolution of the Internet. It is a major breakthrough in the ability of the Internet to collect, analyzes, distribute and translate data.(Evans, 2011)

The term "Internet of Things" (IoT) was used by Kevin Ashton, a RFID (Radio Frequency Identification) researcher in 1999 to describe the use of networked data sensors in retail, manufacturing, healthcare, consumer products and other industries. These sensors can collect data about device usage and ambient conditions. Sensors can be used to allow people and machines to better understand their environment. (Martin, 2016)

Internet of Things describes the real-time networking of objects and things and in particular the convergence of the real and virtual worlds. (Kagermann, 2015) The objects that will be connected to the internet which are essentially a network, it can be anything that you can imagine. The system enables for a large number of things in the network, independent machines or electronic devices to communicate and provide flow of information with each other. Through embedded sensors, light, temperature, pressure, vibration, airflow, humidity, pressure and movement can be measured at a high speed and transmitted as data. With this system, the machines will not only perceive their environment but will be used more effectively with the ability to regulate it. (Guban&Kovacs, 2017) In other words, objects from machine to machine via internet (M2M) or human to machine (M2H) will be able to manage their production process independently by interact with their physical environment. Internet of Things will be applied areas such as infrastructure, health, logistics, business life, community, environment, value-chain management, smart cities, smart water, aviation, smart home and office, automotive, media and entertainment, natural disaster monitoring, production lines, intelligent buildings, recycling and waste management .(Martin, 2016) Today, only a small part of the machines are networked but in the near future more devices will be connected to the network, products or even unfinished products will be allowed to reach common data. (TUSİAD, 2016)14 billion devices are planned to interact with each other through the Internet of Things by 2020.(EBSO, 2015)

2.1.2. Smart Factories

Smart factories undertake the production process with high technology automation systems. The aim is to minimize the human-based errors in production, Machines and equipment will have the ability to improve processes through self-optimization and autonomous decision making.(Roblek et al., 2016)

All tools, equipment, products and even raws providing coordination with each other through embeded sensors, for maximum efficiency. In a study carried out by Aegean Region Chamber of Industry mention three feature of smart factories. Smart factories are very successful in managing complex production processes quickly and smoothly. Products from smart factories are more trouble-free and last longer. In a smart factory, people, machines and production resources interact deeply with each other.(EBSO, 2015)

2.1.3. Cyber-Physical Systems

The convergence of real and digital worlds lead to physical objects are enriched with the flexible capabilities of dijital functions, transforming embedded systems into Cyber-Physical Systems.(Kagermann, 2015) National Science Foundation defined cyber-physical systems as follows: "cyber-physical systems; The basic principles of production processes such as monitoring, coordination and control are managed by mixed technology consisting of a combination of computing and communication. This mixed technology makes it much more intelligent by integrating physical machines with cyber technology.(EBSO, 2015)As a result, the process is referred throughly as cyber-physical systems. Cyber Physical Systems are software and computing power that embedded in physical things .(Almada-Lobo, 2015) Cyber physical systems mean that mechanical and electronic accessories are all interconnected and communicated within a network. This network covers everything that exists in the production cycle, not just the machines in it. Products and services or even raw materials and unfinished products are included to this network as part of the value system.

2.1.4. Big Data

Cyber physical systems gather substantial amount of data from its digital environment, hence requires a huge size of storage for the management of this data. (Kagermann, 2015) Therefore**,** the cloud computing systems are expected to play a very important role in the industry 4.0 (KPMG, 2015) The data is analyzed and generate new information will be used in the entire production line to optimization, quality and efficiency, real-time detection of defects and malfunctions**.** With the analysis of the information coming from a wide variety of sources, it will be possible to solve the defects in production.

2.1.5. Smart Robots

Robot is an electro-mechanical device that capable of performing autonomous or pre-programmed tasks.(Wikipedia) But smart robots can learn also teach to people, work with people, perform complicated tasks in production line and provide support, competent to decide independently. Intelligent robots will interact with machines, materials and other agents to increase productivity in production. (EBSO, 2015) Robots are used in various industries for a long time. Robot technology is becoming more flexible and prone to come together to work on by developing the competencies and also their purchasing costs are decreasing gradually.

In the future robots will increase their interaction with each other and people and workside by side with more secure and flexible .(TUSİAD, 2016) Today, robots are mostly used in industrial purposes. Especially a large number of robots are used in the automotive industry (EBSO, 2015)

2.1.6. Simulation

Simulation enables the products to be designed and tested in digital environment before actual production for take necessary measures to determine possible defects and errors that may occur in the production process. The use of three-dimensional simulations of products, materials and production processes during the design phase is expected to become increasingly widespread in the future. These virtual models, which are created by taking real time data, increase the quality and efficiency that will enable the product to be tested before production in the virtual world. (TUSİAD, 2016)

2.1.7. Vertical and Horizontal System Integration

Integration is defined as multiple systems coming together through programming, computer networks or corporate applications to form a single system. The higher the integration with the subsystem the more increase in functionality. At this point, engineers are ought to add integrated modules in the design phase to be integrated into other systems.(EBSO, 2015)

2.1.8. Cloud Computing Systems

A cloud system is to store large amounts of data on a server that can be accessed at any time with an internet connection instead of being stored on local data servers .(Guban&Kovacks, 2017) Cloud computing has originated from a search engine platform, and is a computing technology that capable of delivering low cost and high performance. It is currently an important platform that offers a variety of Internet services.(Zhou et al., 2016) Computer theorists predict that the cloud system will significantly shape the future of the Internet. According to this, in the future, it will be possible to reach the applications via direct cloud without creating any infrastructure in the devices due to the use of online clouds instead of computer hard disk. Moreover, cloud computing systems, as a growing sector, will be a field that has lots of competitions and companies make this information distribution will have a significant position. Also it would result a number of legal problems, as well as issues such as ensuring the security of personal information and preventing unwanted access to the clouds. (EBSO, 2015) In the following period, a large amount of data will be shared between companies and facilities. With increased performance of cloud technologies, processing times will drop to milliseconds. The data of the machines will be transferred to the cloud platforms and even the systems that carry out process control will be transported to the cloud system.(TUSİAD, 2016)

2.1.9. Cyber Security

Companies produce by using independent management and production systems. In order to protect the production lines and cyber physical systems against security threats and cyberattacks, with the increase in ability of connection with the systems, secure communication is getting more importance to determine the identity of each machine in the system and provide access to them.(Evans, 2011) Cyber security ensures that data security is kept under control. Otherwise, regular presence of the devices on the internet can cause data loss and inability to provide information security.

2.1.10. 3D Printers (Additive Manufacturing)

3D printer is a device that converts virtual three-dimensional computer data into real objects. Nearly everything can be produced with 3D printers, except for electronic components and motors. The printer works; firstly, the product is modeled as a 3D object by creating a prototype in the computer environment and divided into layers as virtually. In the printing process, the product is printed by pouring the melted raw material each layer as overlapping. With 3D printers, everything from artificial veins and human tissues to toys and wrenches can be produced and also it is even possible to construct buildings from giant printers in the construction sector. (EBSO, 2015) Today, aviation companies benefit from additive manufacturing techniques to reduce raw material costs and reduce the weight of vehicles. (TUSİAD, 2016)

2.1.11. Augmented Reality

Augmented reality blurs the line between the virtual and the real universe, ensures that our senses such as; seeing, touching, feeling, hearing, sniffing, take an action in virtual world which was created. With the application of augmented reality, inputs which arouses human senses and emotions is being reproduced and encriched by computer in a virtual environment, emerging reality is presented to the user's perception. Enrichment occurs in real time and communicates with surrounding objects. Augmented reality is an innovation to be used intensively in many activities in production processes. For instance, it helps industrial designers to examine operations and their designs before they are completed. With augmented reality, you can show your customers what's inside, without opening a product's package by preview. The use of augmented reality also provides benefits for assembly lines. Boeing, BMW and Volkswagen use augmented reality in the assembly line to improve manufacturing and assembly processes. In big machines, because of multiple layers or structures, maintenance is also difficult. Employees with the help of augmented reality will be able to make maintenance easier because they will see the location and cause of the problem more clearly. Augmented reality applications has already been started to benefit from**.** For instance, Siemens has developed a three-dimensional virtual training module with augmented reality feature. This module which is connected to database teaches employees what to do in case of emergency. (RüBmann et al., 2015)

3. INDUSTRY 4.0 IN THE WORLD AND IN TURKEY

The emergence of Industry 4.0 is closely related to shifting global production from the west to the east.(Khan, Turowski, 2016) In the last two decades, there has been a serious axis shift in global industrial production. Currently, most of the of the giant brands moved production facilities to China, Indonesia and other Asian developing countries, to benefit from the advantages of cheap labor. The share of developing countries in worldwide production is 40% and in the last two decades they have doubled their share. Western Europe as part of the traditional manufacturing industry has lost 10% of value added in production. (Roland Berger, 2014) Industry 4.0 is the product of R & D studies developed to stop this trend. Extracting human from production, also provide cost reduction and decrease in error rates are main objectives for the fourth industrial revolution.

Industry 4.0 is expected to come up with benefits in four areas. These are; productivity, revenue growth, employment and investment. (RüBmann et al., 2015) There will be significant improvement in efficiency. According to survey conducted by PWC companies expect 3.6 % p.a reducing on operational cost on average while increasing efficiency by 4.1% annually (PWC, 2016)

In the next 5-10 years, the conversion costs which exclude the cost of materials are estimated to improve between 15% and 25% in German manufacturing sectors. When raw material costs are included, productivity gain is expected to be between 5% and 8%. These improvements, for instance, will impact an 90-150 billion euros in German manufacturing sector. Industry 4.0 will also drive revenue growth. The increase in revenue growth would be 1% of the GDP in Germany, which corresponds to an increase of about 30 billion. On the other hand, in order to adapt the production processes to Industry 4.0, 1-1.5% of the revenue of the producers should be allocated to the investment. (RüBmann et al., 2015)

Employment is another area where the effects of Industry 4.0 will be deeply felt. With the employment of robots and machinery rather than low-skilled workforce, a significant reduction is expected in employment for this type of workforce. However, employment is expected to increase by 6-10%.(TÜSİAD, 2016) According to a research conducted by Oxford in February 2016, it's concluded that artifial intelligence will take away 50% of jobs in the United States, 35% in the UK, 77% in China, 57% in OECD countries from people. However, the fourth industrial revolution, like other industrial revolutions, will reveal its own professions. In this context It is expected that many new professions emerge which does not needed today. For example; Data Center Technician, Digital Sense Developer, Robot Mechanic, Digital Data Garbage, etc. (MTSO, 2017)

It is obvious that the qualifications required by the employees will change as the employment of the low-skilled workers will be replaced by the automation systems. More efficient workforce will be needed to effectively manage new technologies. Also have a wide acquaintance with network systems, statistics and programming principles will gain importance. This competency transformation is one of the most important challenges ahead. (RüBmann et al., 2015) In the next 10-year period, while the non-qualified labor force is expected to decrease by 400-500 thousand, there will be about 100-500 thousand new job opportunities which will be brought up by economic growth as well as 100 thousand qualified labor force. Decrease in the number of employees will compensate for employment losses of 2-3% annually. (TÜSİAD, 2016)

Industry 4.0 is also projected to cause structural changes on sectoral basis. All these digitalization and automation processes will have significant impacts on small and medium-sized enterprises. Although the severity of this effect cannot be precisely predicted, it is likely to deepen the existing differences between large and small enterprises. As a matter of fact, while large enterprises are starting to move towards Industry 4.0, small enterprises have not yet reached the level of awareness about the process.(Sommer, 2015)

Industry 4.0 and related technologies are becoming more important in terms of global estimation. Some of the predictions can be listed as follows:

-In 2018, the number of robots will be used in industry will be 3 million and the number of connected devices will be 29 billion.

-In 2020, the market size of Internet of things will be $ 1.7 trillion,

-In 2025 the manufacturing process in developed countries will be based on automation at 15-25% (TÜBİTAK, 2017)

Until 2020, it's estimated that 6.5 billion people and 18 billion objects will have been connected to the mobile network, (Kagermann, 2015) also in 2020, it is foreseen that approximately 50 billion devices will communicate with each other. As a result of the combination of intelligent production systems, smart city, home, logistics, network, device elements with social and e-commerce networks; data, services, objects and the ecosystem network will be established by individuals by using the internet environment is predicted to affect approximately 46 percent of global trade volume in the next quarter century.(Sahin, 2017)

Industry 4.0 approach in term of Turkey means that competitiveness in production, sustainability and produce high value-added products and services.(Sahin, 2017) In the report prepared by TUSIAD and BGG expressed that with the adaptation of industry 4.0 technologies, total productivity increase in manufacturing sectors will be around 4-7% in Turkey and yield between 5-15% increase in the cost of conversions. It is expected that the competitive advantage gained through the economy that will be formed within the framework of Industry 4.0 will increase by 3% annually in industrial production. In order to incorporate the Industry 4.0 technologies into the production process, it is estimated that approximately 10-15 billion TL investment should be made, which corresponds to approximately 1-1.5% of the annual revenues of the producers in the next 10 years.(TUSİAD, 2016)

Industry 4.0 is an opportunity for Manufacturing Industry in Turkey to leave the low value-added production cycle. Developments in other countries of Industry 4.0 applications will intensify the competition pressure on Turkey. If Turkey does not realize Industry 4.0 investments, it will face increasing competitive pressure caused by both developed and developing countries via the improvement in productiviy with the implemention of ındustry 4.0. This will cause a fall in the market share and trapped Turkey in a vicious circle of low value-added production. (TUSİAD, 2016)

Digital maturity level of turkish manufacturing industry is somewhere between industry 2.0 and Industry 3.0. Three sectors with the highest maturity are; Material (plastic, rubber), computer electronics and optical products, Automotive and white appliances. Three technologies that are considered to provide the highest value added; automation and control systems, advanced robotic, additive production. The three sectors where the added-value is expected to be the highest; will be machinery and hardware, computer and electronics, automotive and white appliances.(TÜBİTAK, 2017)

However, the implemention of industy 4.0 succesfully with cost efficiency, high production pace, flexibility, high quality, increasing qualified workforce; increases Turkey's global competitiveness, share of high value added products in total production, changes the labor profile and new employment fields are expected to emerge. (TUSİAD, 2016)

4. COMPETITIVENESS

The concept of competitiveness is generally handled and defined at three different levels: firm-level industry and international (national). Firm-level competitiveness described as any firm can produce at a lower cost than its competitors in national or international markets equal to or better than its competitors in terms of product quality, service offered or

attractiveness of the product, and also have the ability to innovate and invent. Industrial competitiveness is the ability of an industry to achieve and maintain a level of efficiency equal to or higher than its competitors, or its ability to produce and sell products at an equal or lower cost than its competitors**.** National (or more commonly used international) competitiveness is defined as the ability of a country to produce goods and services in accordance with the conditions and standards of international markets while increasing the real income of its people in the long term under free and fair market conditions.(Aktan, Vural, 2004)

The competitiveness express the competitiveness at the level of relatively higher incomes and employment in international competition of firms, industry, region, country or economic integrations, in other words in terms of price, quality, design, credibility and on-time delivery a country's goods can compete with other countries.(Demir, 2001)

The competitiveness of the a country depends on factors such as the level of development and efficiency of R & D activities, the performance of various sectors, the country's foreign trade surplus, the production of high-tech goods and the presence of skilled, trained labor force. While analyzing competitiveness with all these indicators; factors like democratization, tax structure, human rights, quality and freedom of education etc. which plays an important role in determining the position of the country in the world must be taking into consideration.(Çivi, 2001)

4.1. The Impact of Industry 4.0 on Competitiveness

According to the US Competitiveness Council, the factors that determine the competitiveness have changed over time. Whereas in the past "quality and low production costs" were an important determinant of competitiveness, the impact of these factors has decreased today. According to this institute, which states that it is not possible to compete via low labor costs, equal access to markets with other firms and production of standard products by using standard production methods; Nowadays, it is expressed that competitiveness can be achieved by having innovation capability and launching produced goods and services depending on this ability before the competitors**.** (Porter,Stern, 1999)

Technology and innovations are very important in terms of competitiveness of firms. Enterprises which renew their technologies, products and other factors can increase their competitiveness more easily. R & D activities should be given importance for changing technologies and making innovations. (TİSK, 1995) In order to increase the competitiveness of the companies by using new products and technology, there should be an encouraging environment. According to Porter, innovation is the source of competitiveness. In today's industries, where knowledge is intensly used, prosperity is based on innovation capabilities rather than low cost. Innovation provides increase in added-value and productivity for countries also raises the competitiveness, as well as helps figuring out global problems. In a competitive environment created by new technologies and globalization, specialization in technological innovation is the underlying reason for the ability to achieve international competitiveness. (Sarıçoban, 2013)

R & D leads to technological development, technological development leads to efficiency and high quality production, which bring along profitability and wealth by increasing competitiveness and global market share. Therefore, it can be said that the main factor determining the competitiveness is high and sustainable productivity increase arise from R & D and innovation**.** Effective competitiveness institutions and rules that nourish the competitive environment and the labor force with high level of education and superior skills that can use innovation to improve production processes and products are also the main factors that inreases competitiveness.(Taş, 2005)

As a new production model industry 4.0, new generation products and production processes are designed, controlled and coordinated by the digital and smart elements in its content and thus faster, efficient and error-free production is realized. Undoubtedly, thanks to these new generation production processes, significant savings will be achieved as a result of cost reductions in production stages, mass production and customizable products will increase, and national economic growth and macroeconomic growth and welfare will increase. (Salgar and Dereli, 2018)

In this century, competition in trade has perhaps reached the top. At this point, the competition has a mission to meet the basic requirements of the country in terms of productivity, welfare and high income level. Adaptation of new technologies has a vital role for sustainability of competitive power in industry.

Countries that adopt Industry 4.0 technologies are expected to be advantageous in terms of global competitiveness due to serious cost advantages, and those who do not adopt are at the risk of losing their existing competitive advantage. As a result of that, if Turkey do not change it's cost structure while Germany realizing industry 4.0 transition, it is obvious that Turkey will lose it's regional competitive advantage. (TUSİAD, 2016)

Turkey already has structural problems in terms of competition structure and most important problems are; high dependence on imports, low share of high value-added products in total production, inadequacy of skilled workforce and low R & D expenditures.

In recent years ranking of the Global Competitiveness Report, it is shown that there is a decrease in Turkey's competitiveness power. While in 2014-2015 period Turkey was on the 45. Rank, it has dropped to 51. in 2015-2016 period. The next year, with a four-point decrease, took place in 55th place among 140 countries and raised by two points in the 2017-2018 period to 53th place among 137 countries. In terms of the sub-index, market size as the most advantageous point take 14th place. Also technological readiness ranked at 62th and innovation ranked 69th (WEF, 2018) Industry 4.0 report by TUSİAD express that Turkey is at a crossroads that between losing dünya çapında competitiveness or taking a giant step to participate developed countries. If Turkey's economy does not keep up to new innovations, can be lost global competitiveness it already has.

5. CONCLUSION

The process of industry 4.0 will provide many advantages to the production process. Smart products, individualized special production, saving on raw materials and resource use, productivity increase, smart self-governing factories, a new production order, unskilled workforce reduction in employment caused by the increase of using robots in production, minimum margin of error in production are just a few of them.

Traditional production systems are eventually doomed to disappear in the long run. This is why Industry 4.0 vision adaptation is very important for developing countries like us. According to some experts, it is our way out from the middle income trap. At this point, the change in mentality is one of the most important problems we face. It is a necessity for us to notice quickly the developing trends and intensify our efforts in this direction. The adaptation of new technologies requires a change of mantality as well as many structural and organizational changes. The most primary need of Turkey, which is positioned between Industry 2.0 and 3.0, is a method accounting.

In addition to many advantages brought by Industry 4.0, it's disadvantages should be taken into consideration. The change of the necessary skills in the labor force and the phenomenon of unemployment is one of them. Considering inadequately trained workers and required time for society to become familiar with new technologies, it is possible to say that the future projections about unemployment are not very bright.

Industry 4.0 have a substantial potential to change global competition environment. If Turkey wants to stay competitive, Industry 4.0 should be analyzed in detail with respect to its advantages and disadvantages in the global level and road maps should be prepared for the integration of the digital innovations that can be implemented urgently to the production systems and for the ones that will requires more time and cost, road maps should be prepared for integration into the manufacturing industry within a plan. Although, the coordination of the major industrial organizations and the relevant units of the state is very important, inclusion of universities to the process will be very beneficial.

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