

## New Professions Expected to Appear in Services Sector in Relation to Industry 4.0<sup>1</sup>

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**ABSTRACT:** Industry 4.0, a name often heard in recent years, is a concept that covers data exchange, production technology and modern automation systems. In other words, Industry 4.0 points to a new process in which machinery and devices will communicate communally over cyberspace and gain a new dimension in production. Industry 4.0, also called the Fourth Industrial Revolution, which created in manufacturing, is a phenomenon which will make monitoring of processes with digital means possible, is expected to have effect in a wide range such as production, information technology, security and communications. With the Fourth Industrial Revolution, it is observed that there is a radical change in the expectation that it will be effective in a wide range of sectors from the employer to the employees, in the economic structured working system in many different sectors. In this study, the effect of this change which will be experienced with the Fourth Industrial Revolution on occupations in the services sector is examined. In this context, the overall situation in the services sector was first assessed, and the development process of the structure of the services sector and the period up to the Industrial 4.0 period was examined. Second, with the Fourth Industrial Revolution, the expected changes in the services sector and the consequences of this have been researched. Finally, it focuses on the new occupations that are expected to arise in the services sector after the Industrial 4.0 period. In this study, literature review, field study, primary data acquisition and fictional data development methods were used.

**KEYWORDS:** Industry 4.0 and Services Sector, Transformation in the Services Sector, New Occupations After the Fourth Industrial Revolution.

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### 1) INTRODUCTION

At the end of the 19th century, the Industrial Revolution in Europe, the form of post-production, has shifted, and the agricultural labor force has shifted to the industrial world. Parallel to the industrial revolutions, the globalization of the economy has revealed itself in two areas: the capital flow has been liberalized and the production has been displaced. The capital has shifted to the most profitable area and the lowest cost of production. Over time, the Far East countries, the largest source of cheap labor, began to produce their own goods. The reason for the emergence of the industry 4.0 in Germany is that the German government is aware of the fact that the market is moving to the Far East and is taking measures.

Industry 4.0 is related to the development of artificial intelligence, the complete takeover of production by robots, the production of three-dimensional printers, the removal of fabrics from houses, the analysis of massive amounts of information by data analysis. The indirect aim of the fourth industrial revolution is to increase the human power of value added from the physical level to the mental level. In this process, the services sector in which the brain power is most used is expected to change. The aim of this study is to analyze the changes in the services sector in the industry 4.0 process and to introduce new business lines that are expected to emerge, in parallel with the gradual decline in labor share in employment.

### 2) OVERVIEW OF SERVICES SECTOR

In this part of the study, the structure of the services sector is emphasized and the development that it has been in as much as the industry industry 4.0 process has been examined.

#### 2.1) Structure of Services Sector

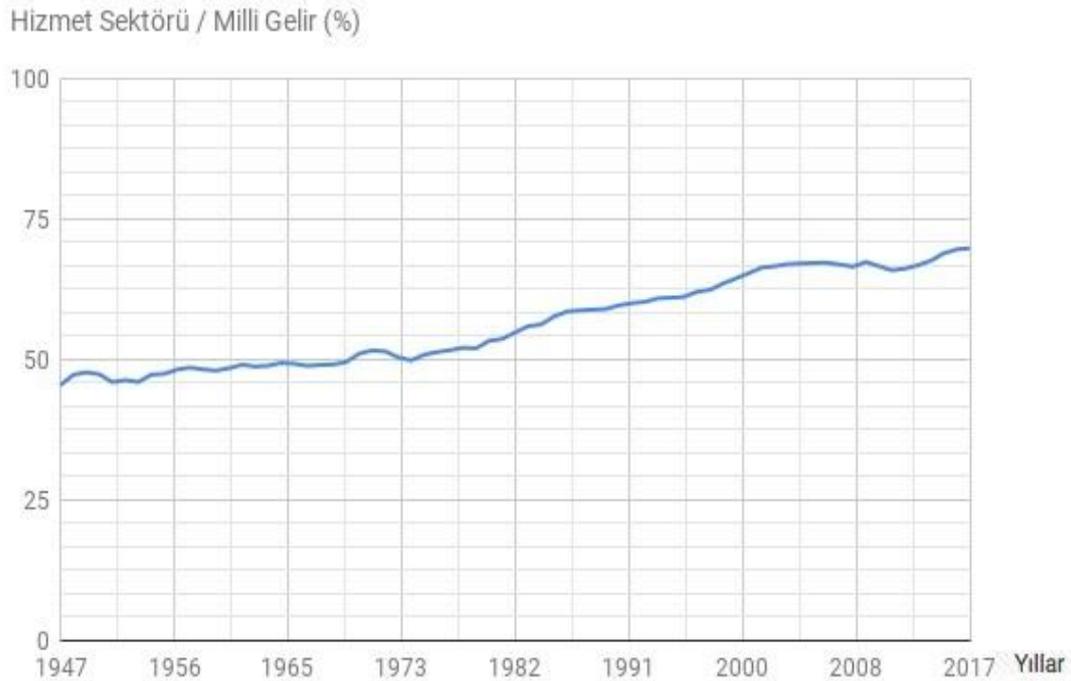
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The services sector rose to prominence in developed economies in 1950s onward. The first trend to be observed in an economy transforming into a service economy is the increase in the share of services sector employment in total employment. The increase in employment in the services sector can be attributed to three factors: the increase in demand elasticity of service demand, the increase in demand for intermediate services in emerging economies and the surplus service demand to be met by labor transferred from other sectors.

The increase in the share of services sector value added in GDP can be regarded as another trend of the economy that is transforming into the service economy. The first country in the world to become a service economy is the United States. The national share of the services sector in the US from 1950 to 2018 can be explained in Table 1:

**Table 1: National Share of Services Sector (US)**



**Source:** Bureau of Economic Analysis (2017)

As seen in Table 1, the share of services sector production in the US in national income was 47% in 1947. It is known that the US turned into a service economy in 1950. It is seen that the services sector / national income ratio, which has been in an increasing trend since 1950, has remained at 70% when the data of 2017 are examined.

## 2.2) Evaluation of Services Sector Before Industry 4.0

In parallel with the development of the industrial sector in the world, there have been three industrial revolutions. The Industrial Revolution came into being in the late 18th century as the machinery of production and the transfer of the obtained products to the production centers by railroad network. In the second half of the 19th century, the 2nd Industrial Revolution took place with the serial production in the industry and the transfer of the produced goods to the consumption centers by the railway and highway network. The 3rd Industrial Revolution, which took place in the form of automation of production and reduction of human labor in production, emerged in the second half of the 20th century. Industrial revolutions not only affected the industrial sector, but also created an environment for the development of the services sector in parallel to the industry. When the effects of industrial revolutions on the services sector are examined in this framework, the most important result is the decrease in the share of human power in production. The use of machines instead of human force, which is described as labor in production, allows production to be done with fewer deficiencies, cheaper and faster.

### **3) CHANGE AND TRANSFORMATION OF SERVICES SECTOR WITHIN THE SCOPE OF THE FOURTH INDUSTRIAL REVOLUTION**

In this section, firstly the forecasts related to the areas where the fourth industrial revolution will be effective in the services sector are shared, and in the following it is mentioned the business lines that are predicted to disappear in the mentioned areas.

#### **3.1) Evaluation of Potential Effects of Industry 4.0 in Services Sector**

The world has witnessed industrial revolutions since the 18th century. Industrial revolutions up to 4.0 have two common characteristics. These are the shortening of the labor between the revolutions and the reduced need for labor.

In industry 4.0, the effect of the capital in traditional sense decreased; everything is based on intelligent production systems that evolve in parallel with digitalization and technology. Until today, the capital that is defined will not be in the old power. For example, there is no need for large amounts of capital for applications such as Instagram and WhatsApp, which are purchased from application markets.

In addition to the advantages of Industry 4.0, there are also negative aspects to be considered. For example, when robots take over production, the need for human power will be reduced, and robots will have a sense of humor. This poses a risk not only for blue-collar employees in factories but also for white collar workers. Because robots capable of coding and designing with artificial intelligence, they will take over production. The important point here is shudder. The reason why the use of artificial intelligence is positive or negative for people in terms of employment is also the reason. It is the person who designs, directs and makes artificial intelligence. Therefore, artificial intelligence will make it easier or harder for people to work.

#### **3.2) Professions to be Redundant After Industry 4.0**

Professions are one of the basic elements that constitute the personal identities of individuals in social life. Occupations have been shaped in the modern sense in the recent past, but the subject matters such as division of labor and management are much older. Industrial revolutions are one of the most important factors influencing the role change in the historical process.

Industry 4.0 has three main objectives. These are to speed up the production by minimizing the human labor in production and bringing production faults to a minimum level, reaching maximum flexibility of production and desire to develop special products for consumers. This will prepare the environment for the cheap labor advantage to disappear and the qualified workforce to gain importance.

According to a report by Forrester, a research firm based in the United States, it is predicted that by 2027, artificial intelligence will capture 17% of employment in the United States, and on the other hand, will create new business areas that will come to the forefront of qualified employment and 10% . (Forrester, 2017) In this framework, it is not the case that artificial intelligence assumes all the work that people have done yet. The robots will still undertake routine routine tasks. It can be said that artificial intelligence is mainly active in the services that the narrow income group works. In the case of creativity, work that is based on complex communication processes and focused on solutions will continue to be done by people. In this context, it would be more efficient for employees to use it to facilitate their work rather than fearing artificial intelligence. The professions in which artificial intelligence can take place in the near future are the following:

##### **3.2.1) Call Center Operators**

Nowadays, conversations can be established between computers and customers at the personal level through speech processing and machine learning. According to the Independent, the financial company Swedbank uses a personal assistant led by artificial intelligence called Nuance Nina for customer inquiries. (Hoikkala and Magnusson, 2018) Thanks to Nuance Nina, 78% of the cases can be solved at the moment of problem. Company surveys show that most of the customers prefer to communicate with a virtual assistant. The development of artificial intelligence and language processing skills can take call center operations from people, making it possible to understand different languages.

##### **3.2.2) Courriers**

Founded in 2014, the company Starship Technologies, 10 kg. cheap courier boots that can carry as much weight as in November 2016 and started to work through the online eatery named Just Eat. (Gerrard, 2017) The company plans to become a pioneer in the sector with more courier boots. Deliveries can be done correctly and faster through courier boots, which can increase customer satisfaction, and the additional cost problem can be removed from the company.

### **3.2.3) Surgeons**

In the health sector, artificial intelligence and automation are available at many stages from disease diagnosis to surgery. Robots carry out surgical procedures with higher performance than healthcare workers. In the study published in *Science Translational Medicine* in 2016, the Smart Tissue Autonomous Robot (STAR) is said to have successfully planted the piglet small intestine more successfully than the human can.

With robotic surgery, fewer errors are made without external factors such as stress or fatigue. In addition, patients who are operated on will feel more comfortable with the awareness that the automated system is much less likely to make mistakes.

### **3.2.4) Agriculture**

Agricultural 4.0, which emerged with Industry 4.0, enables high-tech agriculture through robotic systems, internet of objects and tractors without drivers. It is possible to cultivate crops without needing humanity. FarmBot, a product that shows the last point of technology in agriculture, can plant, sow and grow crops by controlling weeds. (Watkins, 2016). In addition, the system can be controlled via a mobile application. Thus, farmers become a manager rather than a laborer.

### **3.2.5) Retail**

Lowe's, a retail service company, is promoting a robotic assistant fleet called OSHbots in a hardware store in California. These bilingual robots are helping customers find the products they want in the store. For example, if a product is not available at the store, OSHbots knows how long it has stayed in the store, so the customer can quickly respond to customers without taking the time of the customer.

### **3.2.6) Restaurants**

A hamburger restaurant in Pasadena serves a robot called Flippy. Working with a multi-sensor system infrastructure, Flippy is able to offer a customer a complete hamburger by itself. Designed by Miso Robotics, the robot is now being tested by CaliBurger. In the near future CaliBurger plans to build Flippy at fifty different locations. Serving robot cooks such as Flippy in fast food restaurants can only cause 2.3 million workers in the US to get out of business. (CBS News, 2018)

### **3.2.7) Education**

Thanks to the opportunities provided by artificial intelligence, the concepts of distance learning and distance learning take their place in human life. Nowadays, besides video training, robot teachers have become able to see at work. England's first robot teacher, Pepper, is a training robot that teaches at London Design and Engineering University Technical College. (Kovach and Mogan, 2018) At the same time, a robot pre-teaching in a school in Japan is equipped with HD cameras, microphones and 3D sensors to communicate with students and to understand their feelings.

## **4) EMERGING NEW PROFESSIONS IN RELATION TO THE FOURTH INDUSTRIAL REVOLUTIONS**

### **4.1) Industrial Data Analyst**

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### **4.2) Robot Coordinator**

In factories, semi-autonomous, autonomous and even humanoid robots have begun to be involved in production processes. The robot coordinator will be a new profession to undertake the tasks of controlling the robots operating in the production process and responding to any malfunction or fault signal. In addition, following the urgent and routine maintenance and repair work and applying to experts when needed will be among the job description of this profession. When the robot is forced to be out of service, the robot coordinator will replace the robot with a backup to reduce the effects or reduce the impact.

### **4.3) IoT (Internet of Things) Solutions Architect**

The information and technology systems of production companies are becoming more complex every day. IoT solution architects are responsible for the design of the entire system to control the interconnected and increasingly number of products and machines. They are also responsible for many of the computer-mediated

applications such as maintenance control and remote management. IoT solution architects need to have technological competencies such as data management and applications as well as know-how computing experience.

#### **4.4) Cloud Computing Expert**

In the recent past, all the data that can be processed by the computer was stored on the hard disk of the computer. This method had some disadvantages. For example, when going a long distance, it was not possible to reach the data stored in the hard disk. With the increasing popularity of the Internet, it becomes possible to store all kinds of information on a system called cloud. Through the servers connected to the internet continuously, it is possible to reach the data stored on the cloud at the desired place.

Cloud computing requires great effort and effort to provide a smooth user experience. Cloud computing experts need to be selected from those who have experience in software engineering, systems and network management that can come from this process. The Internet of objects requires that cloud computing experts design and develop applications that work with interconnected devices. They need to know know-how to do that. The key point here is that companies want to work with the best experts in this area for the management of billions of dollars of equipment.

#### **4.5) Data Security Expert**

The fact that many devices are connected internete within the context of the internet of objects increases the possibility of a related collapse and gives an environment for the unauthorized examination of the data. Data security experts should be familiar with the working principles of the Internet and protect devices that operate over the Internet from the possibility of remote attack. Plans should be made to protect all kinds of digital data, from intelligent traffic lights to individual sports and health records, and data trends should be analyzed. In addition, it is necessary to have continuous backup plans considering the possibility of breakage of security.

#### **4.6) 3D Printing Engineer**

Three-dimensional printers, which take a three-dimensional model on a computer and process the layer layer and form the object, have been in use for a long time and have been useful for companies in the last few years. Prosthetics, toy and gun parts are only some of the objects produced by three-dimensional printers. In addition, by bringing together the necessary circuits, a product that comes out of a three-dimensional printer becomes operable with the internet of objects. Sensors built for a heart patient in this frame can monitor heart function and check if the heart is functioning properly. In order to be able to create advanced three-dimensional printer products like this, three-dimensional printer engineers need to know how to connect printers with software and know how useful different types of plastics are in three-dimensional printers. The fact that three-dimensional printer engineers have worked in the mechanical and industrial engineering fields will help them to find an important place in the process with developing technology.

#### **4.7) Wearable Technology Design**

Today, many companies are working on wearable technology in parallel with the rapid development of electrons. The majority of young people demand truly wearable technology products. Bracelets that can count heartbeat, calculate calories burned, and display values are the most recent examples of this technology. Other examples of this technology are intelligent jewels that are able to prevent objectionable movements and track movements, or have pilates or navigational abilities. It can be said that such design products are as hard as engineering in terms of engineering. In addition, it is difficult to ensure that the products are interesting in terms of appearance. Only a small percentage of consumers will evaluate products only in terms of technology. Wearable technology designers must follow the most up-to-date technology and fashionable outfits and accessories for their purposes.

### **5) CONCLUSION**

The concept of Industry 4.0 can be defined as a general way of putting the physical power into the mind in the processes of production and service. It is expected that the services sector, which is the most used economic field of mind power, will undergo significant change in the course of the fourth industrial revolution. The use of artificial intelligence and automation in the services sector will affect employment quantitatively and qualitatively. Daily routines that do not require special skills or equipment will be transferred to artificial intelligence. In this context, it is probable that the employment problems of the individuals working in the professions addressing the narrow income group. This situation increases the opinion that automation will adversely affect employment. However, when automation takes over the standard work, we need the qualified workforce to manage the complex systems running on the internet of the objects we have just met. Artificial

intelligence is expected to improve employment in terms of quality and productivity. In the digitalization process, not the physical power but the mind power that can solve complex problems, think creatively and evolve is emerging. With Industry 4.0, it will take place at the forefront of skill, the simultaneous control of multiple systems, and the management of complex systems.

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