



AN INVESTIGATION OF THE IMPACT OF THE CONCEPT OF SOCIETY 5.0 ON TOTAL QUALITY MANAGEMENT: THE FUTURE OF HUMAN- ORIENTED TECHNOLOGY STUDIES "SOCIAL QUALITY"

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ABSTRACT

The Industrial Revolution, which started with the invention of the steam machine in 1778 by James Watt, brought along the 4th and 5th Industrial Revolutions with the development of information and communication technologies in the 21st century. With the 4th Industrial Revolution announced by Germany in 2011; The idea of integrating industrial processes with information communication technologies, IoT, sensors, artificial intelligence, and robotic solutions has changed with the Society 5.0 concept announced by Japan in 2016. The most important aspect of the Society 5.0 concept that distinguishes it from the Industry 4.0 concept is; The concept of Society 5.0 puts human and human needs at its focal point. The concept of Total Quality Management (TQM) is a management philosophy that has played an important role in the development of many countries in the world, especially Japan and America, and the industrial sector since the second half of the 20th century. However, as in every approach and system, TQM has been affected by the changes in both technology and the business world over time. The developments experienced caused the restructuring of TQM. Within the scope of this study, a theoretical study was carried out on what kind of effects Society 5.0 might have on TQM strategies and the concept of Social Quality have introduced.



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1. INTRODUCTION

Due to the technological, economic, and social developments that took place in the 21st century we are in, a rapid change process is experienced all over the world. As a result of the rapid changes in information communication technologies, fundamental changes have occurred in many sectors, especially in the production and distribution sectors; The concept of Industry 4.0

emerged as a result of combining information communication technologies, artificial intelligence, and the Internet of Things (IoT) and industrial activities. Thanks to these technological developments, companies have managed to organize their business processes and bring together global or dispersed production/service lines in a more efficient, faster, and less costly way.

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According to Buchi et al. (2018), The concept of Industry 4.0 (also known as the 4th Industrial Revolution) was first used by Rastow in 1988 to refer to "processes that turn into innovation by the inclusion of academics in production teams". According to the literature, the concept of Industry 4.0 was used for the first time in 2011 and was introduced in 2013 in Germany Hannover Fair (Sader et al., 2017; Qin et al., 2016; Zezulka et al., 2016).

As a result of the rapid changes in technology with today's globalization, being able to tender a customer-oriented, innovative, and personalized product or service to the market is the most important key to competition. In Industry 4.0, it enables people and machines to communicate with each other over the internet, regardless of time and place concepts, through information communication and sensor technologies. In this way, the operational processes of the enterprises shorten, the input and production costs reduce, and the efficiency and quality increases. Thanks to the "personalized mass production" flexibility brought about by the concept of Industry 4.0, companies have the opportunity to manufacture customer-specific products instead of one-type mass production.

In addition to the advantages, it offers in the fields of speed, competition, cost, quality, efficiency, and trust; Industry 4.0 also has enabled economic growth, innovative solutions in the field of health, and the implementation of many solutions that will positively affect social life. However, as a result of these rapid and radical changes, Industry 4.0 brought not only advantages but also many disadvantages.

There are also many negative developments such as the emergence of social complexities within the social change, the inability of people to adapt to this change, resistance to change, and the fear of being unemployed in time by people in the middle age due to the disappearance of some business lines. It is necessary to protect society from these and similar risks and to introduce various new practices with some legal regulations (Fukuda, 2020). Society 5.0 concept, at this point; was born as an important idea for co-creation, human-machine interaction, and technology integration to be people-oriented (Gladden, 2019).

While the impacts of the 4th Industrial Revolution that started in 2013 still continue, Japan presented the Community 5.0 plan, called the 5th Industrial Revolution, as the 5th Science and Technology Basic Plan and a new growth strategy in 2016 (Fukuyama, 2018). Contrary to the first 4 industrial revolutions, Society 5.0 emerges as a structure that suggests being human-oriented for the first time and recommending the implementation of industrial elements with human-oriented studies (Salimova et al., 2019). The main purpose of Society 5.0; is to achieve solutions to the challenges of today and tomorrow by realizing digital

transformation at all grades and areas of society. (Savaneviciene et al., 2019).

In the first part of this study; after analyzing the Industry 4.0 and Society 5.0 concepts, the factors that caused the emergence of Society 5.0 were examined. In the second part of the study; the effects of the Industry 4.0 concept on TQM have been examined and investigations have been made about the possible effects of Society 5.0 on TQM.

2. INDUSTRY 4.0

2.1 Concept of Industry 4.0

Industry 4.0 or with its other name, the 4th Industrial Revolution, the use of existing techniques and technologies used in the industry together with 21st-century contemporary production techniques, the communication of all machines used in the industry with each other through sensor and information technologies and artificial intelligence applications it is the establishment of structures that allow them to optimize their processes (Fukuda, 2020).

The focus of Industry 4.0, which was first introduced in 2011 and introduced at Germany Hannover Fair in 2013; (Sader et al., 2017; Qin et al., 2016; Zezulka et al., 2016; Sader et al., 2017b) bringing together the communication environment between people, machines, places, and devices and thus increasing the efficiency and quality of the products or services implemented; reduction in product/service lead times, error rates and costs; It aims to optimize the machines themselves with artificial intelligence applications and to achieve a competitive advantage by making the use of resources sustainable thanks to all these processes. Industry 4.0 enables a global power to be created by eliminating the concepts of limit and time thanks to the information technology, sensor, robotics, IoT, and artificial intelligence technologies it contains (Buchi et al., 2018; Mosca & Civera, 2017).

As shown in Figure 1, the First Industrial Revolution in industrial history is the discovery of steam-powered machines that emerged in the 18th century. In this way, all manual work has been realized thanks to the machine power. The Second Industrial Revolution took place with the discovery of electrical energy in the 20th century, and thus production processes started to shift towards mass production lines. The most important development of the Second Industrial Revolution is its integration into mass production lines with the development of conventional machines. The Third Industrial Revolution has emerged in the 1970s with the use of PLC systems that allow computer and automation systems to be used together (Saderet al., 2017b; Qin et al., 2016).

As in every industrial revolution, there are reasons for Industry 4.0 to emerge. The first of these reasons is the diversification of people's desires and needs due to the increase in the welfare levels of people and technological developments worldwide, the increase of competition, and the transformation of the idea of "I sell what I produce" into a philosophy of focusing on customer values. On the other hand, in the global trade wars, China's progress towards becoming a new global economy has increased global competition and led to the implementation of effective and efficient methods in industrial production.



Figure 1. Industrial Revolutions (Sader et al., 2017b)

When evaluating the benefits of Industry 4.0 in terms of companies, besides the cost reduction and economic recovery of the enterprises (Fukuda, 2020; Barkat & Beh, 2018);

- Production of large-volume products in a much shorter time and with efficient methods,
- Implementing economic and social activities with information technologies,
- Clear determination of customer requests and needs by collecting, storing, and analyzing data and,
- Coordinating the processes of delivering products to customers and following up after delivery with a much simpler and single structure at reasonable prices as can be expressed.

The most important advantage of Industry 4.0 for customers is that it will allow companies to turn their product-oriented mass perspectives towards customer-oriented personalized processes. The limited product range of companies will allow the production of mass and individually customized products thanks to Industry 4.0 applications (Buchiet al., 2018). In this way, companies will be able to deliver products tailored to the demands and needs of each customer, especially in niche markets, to their customers, and increase their product range with enhanced customer satisfaction.

As with all technological advances, Industry 4.0 has brought some disadvantages as well as many advantages it offers to the industry. The new industrial revolution offers many advantages such as flexible production system, just-in-time production, resource productivity and low labor costs thanks to the realization of some human-led business processes with machines and robots (Wang et al., 2017). However, against these advantages, with the conversion of conventional lines to a full automation system, some professions are gradually disappearing and new professions are being developed.

2.2 The Effects of Industry 4.0 On Total Quality Management

Quality is defined as the conformity of a product to customer expectations and desires. Quality aims to satisfy customers continuously and aims to reduce defects, errors, and deficiencies with the philosophy of continuous improvement (Sader et al., 2017). The Total Quality Management (TQM) approach aims to present the products or services of an enterprise in the same standards and features each time, by the customer demands and desires (Sader et al., 2017).

The term TQM was first introduced by Deming as of the second half of the 20th century in order to help Japanese companies survive the effects of World War II (Sader et al., 2017b). Although TQM was used only for the application of statistical control and processes to prevent product and production errors; It has been applied by Juran to emphasize customer satisfaction by producing products that meet customer needs (Sader et al., 2017b).

With the successful implementation of TQM applications in automotive companies in Japan, it has become a philosophy that is applied all over the world and whose importance is accepted. As a result of the studies conducted so far, much evidence has been found that TQM improves organizational efficiency, flexibility, competitiveness, and the concept of continuous improvement (Anu & Satish, 2016). TQM is a universal management philosophy that is independent of sectors (Sezen, 2011: 69). TQM, which can be used in every field and sector, has 6 basic management principles. These (Sezen, 2011: 69; Sader et al., 2017b);

Customer Orientation; one of the primary goals of businesses is to establish sustainable relationships with customers. Thanks to sustainable customer loyalty and customer satisfaction, companies want to increase their customer numbers and market shares. To achieve this, companies that want to gain a competitive advantage over their competitors through products or services where customer value perceptions are brought to the fore by customer-oriented methods should be able to determine the wishes and needs of their customers, determine the priorities of customers, and supply products and services that can meet the wishes, desires,

and expectations of customers in the market. Customer orientation does not only cover the end consumers, who are the external customers of the business. The value perceptions of the employees, who are the internal customers of the company, like the end customers should be analyzed and the participation of the employees in continuous processes should be ensured (Sezen, 2011: 69). Employee participation is also examined as another principle of TQM.

Supplier Relationship Management; In order for companies to offer products or services in line with the demands, expectations and desires of their customers, their suppliers with whom they have strategic cooperation must participate in this process and produce raw and semi-finished products specific to the expectations. For the enterprises to perform their products or services within the specified standards, they must be prepared following the standards determined in their raw materials and have passed the quality control processes. Therefore, it is important in terms of customer relations that all companies in the supply chain coordinate all stages together and fulfill these processes within the specified standards.

Employee Participation; The term "Total" in the name of Total Quality Management use to express the participation of all employees, suppliers, and all internal and external stakeholders of the enterprise in these processes and to direct the processes according to the wishes and desires of the customers (Sezen, 2011: 69). As stated in the heading of customer orientation, asking for the opinions of employees who are internal customers, encouraging teamwork, supporting the personal development of employees, and encouraging employee initiatives will enable the improvement of business activities and the creation of creative and motivating environments. It should not be forgotten that the concept of quality or quality control is not the task of a single unit or person, but the common task of organizations and their employees in the entire supply chain.

Leadership; a leader in the enterprise is needed for processes such as the progress of TQM in a certain order and structure, the motivation and guidance of the actors in the whole process, and the unity of purpose among all leadership levels to achieve the quality goals of the organization. Leader helps employees to participate in processes, establish standards, and follow up the entire process.

Business Process Orientation; the products and services offered by businesses progress in a circulation that continues from the supplier of the supplier until the product or service reaches the end consumer and continues until the expectations and opinions of the consumer are received through feedback. Within this structure, all processes must be handled separately, and steps must be taken that will allow the elimination of the

causes that may cause faulty or incomplete products. Thus, instead of performing a single control at the end of the production line, a dynamic quality control process realize in the process and the performance and efficiency of the enterprise will be increased.

Continual Improvement Process; which is the philosophy of detecting and correcting deficiencies, errors or inaccuracies within the existing structure; aims for businesses to gain a strong competitive advantage over their competitors. Thanks to the philosophy of continual improvement, businesses will maintain their innovative position against their competitors, sustain their performance, and make customer satisfaction sustainable. Continual improvement will also enable businesses to avoid risks and analyze opportunities early.

With the idea of using personalized mass production and IoT, artificial intelligence, and sensor technologies in production processes brought by Industry 4.0, TQM's concepts of customer orientation, continual improvement, process orientation, and supplier participation support each other. Industry 4.0 enables the better implementation of TQM strategies within the enterprise and the emergence of more effective and efficient products or services by coordinating the two concepts together.

With the realization of Industry 4.0 applications in production lines, especially in factories, companies will begin to supply individual services to customers as a result of offering faster, better quality, improved and personalized customer requests, desires, and expectations. As a result, customer satisfaction will increase, customers' quality expectations will increase and businesses will gain a competitive advantage against their competitors (Saderet al., 2019). On the other hand, thanks to the smart production lines and smart factories that will emerge with the combination of Industry 4.0 applications with today's artificial intelligence studies, faster and earlier predictions about the demands, desires, expectations, behaviours and tendencies of customers will be provided, thus increasing the innovative and innovative performances of the enterprises.

By integrating systems such as ERP and CRP, which allow the management of existing management processes and customer relations of enterprises, with IoT and sensor technologies used in Industry 4.0 processes, human-machine interaction will make faster and the entire process will manage through a single application. Thanks to these technological developments, customers will be able to take an active role in all processes by getting rid of their "buyer" roles, which is the last link to the production process (Sader et al., 2019). In this way, customer expectations and perception of customer quality will increase, and businesses will gain competitive advantage.

With the inclusion of technologies in production processes, production bottlenecks, defects, errors, and deficiencies can dynamically control. Considering this situation in terms of the continuous improvement principle of TQM, machine failures or defective products will detect at an early stage, and thus the dissatisfaction rates that will lead to cost, sell-out, and customer loss will decrease.

Industry 4.0 will also enable companies to optimize their decision-making and resource management processes, which are one of the most important bottlenecks (Sader et al., 2017b). By controlling all processes from the raw material of the products or services offered by the enterprise to the final consumer's opinions about the product or service with information communication technologies, important support mechanisms will be implemented in the decision trees and optimal steering processes of the enterprise. Thus, it is a fact that the optimization of all resources of enterprises according to demand forecasts will occur faster, and resource planning, demand planning, and optimization processes can be implemented with fewer risks thanks to artificial intelligence technologies. The fact that all these processes will carry out on a system within certain restrictions will also emphasize the minimization of risks.

Another advantage of Industry 4.0 is that it will allow connections with suppliers to provide in full integration. Thanks to the fully integrated systems to establish with the suppliers through information communication technologies, the market demands, market forecasts, and consumer trends achieved will enable rapid communication with suppliers, which will increase the response time of the supply chain (Wang et al., 2017).

Total Quality Management is a management philosophy that put forward to ensure that products and services, which prepare in the light of customer expectations, wishes, and desires, can be supplied to customers continuously and at first time standards. Thanks to the 6 basic principles that it incorporates, it is aimed for businesses to always be competitive against their competitors by making continual improvement. In today's tight and challenging trade arena, businesses need to take customer-focused, faster, more convenient, better quality, and always innovative steps to compete against their competitors. TQM enables this philosophy to take place as an organizational culture within the company.

With the development of Industry 4.0 applications over time, the production lines will be monitored at any time thanks to the smart factory, smart machine, and smart control systems, and all product defects will be eliminated, and the optimal structure will be established. This actually means that the quality processes of the enterprises are also optimized and that quality activities are supported by eliminating quality problems (Foidl &

Felderer, 2016). Controlling every step in the process and the fact that these control steps will be done by robot and sensor technologies, not by humans, will allow errors to detect early, moreover will allow errors to analyze at their root causes (Sader et al., 2019).

3. CONCEPT OF SOCIETY 5.0

The digital transformation and technological developments we have experienced in our age have caused the traditional industrial structures to undergo radical changes. Technological improvements, which allow significant developments in many areas such as productivity, quality, value, product variety, have both advantages and disadvantages. Due to the digitalization of all product and service processes of enterprises and the fact that they realize with robotic automation equipment, the trust, and confidentiality issues of these processes appear as important topics. On the other hand, as a result of the digitalization of the processes of enterprises under the umbrella of Industry 4.0 over time, the work of blue-collar workers at the middle age has started to disappear and new professions have emerged.

Following all the positive and negative situations brought about by technological developments and globalization, many important steps need to be taken, such as ensuring that people live better, eliminate economic inequalities, and have equal opportunities in health and treatment (Fukuyama, 2018). All these requirements have led to the emergence of the concept of Society 5.0 in Japan.

Society 5.0 concept emerged in 2015 (Wang et al., 2018) and was announced for the first time in April 2016 with the motto "Super Smart Society" as Japan's new Industrial Strategy to meet the needs of people and increase the quality of life by using people, robots, and artificial intelligence together (Fukuda, 2020; Fukuyama, 2018; Salimova et al., 2019).

The main purpose of Society 5.0 is to meet the needs and difficulties through technological innovations without restricting people (religion, language, race, gender, age, society, etc.) and enabling the solution of social problems (Fukuyama, 2018; Harayama, 2017). Thus, all people, without being specific to just a group of people, will have lived in a society where their needs are met quickly and enjoy throughout their lives.

The concept of society 5.0, in fact, like other industrial revolutions, is more supportive than destructive to the revolution before it. Therefore, we can say that Society 5.0 is the continuation of Industry 4.0. (Salimova et al., 2019; Gladden, 2019). The main difference between them is that Industry 4.0 focuses on factors such as efficiency, speed and quality in production and production technologies; The concept of Society 5.0 has put innovative solutions for people and technology integration that will increase people's quality of life.

Society 5.0 aims to use technologies such as information communication technology, artificial intelligence, the internet of things (IoT), robotics brought with Industry 4.0 to improve people's lives, especially healthcare services (Skobelev & Borovik, 2017). Basically, Society 5.0 tries to integrate Industry 4.0 into people's daily lives by using the technological developments that businesses use to produce products or services (Gladden, 2019).

As a result of all the technological developments in the world, people's lifetimes have increased today. However, although there is an increase in the life expectancy of people, there has been an increase in the number of elderly people in the last 30 years and a decrease in the working population that constitutes the labor force. With the aging of the world population, the decline in the birth rate and the number of working population occur in the medium and long term of many countries in the world; It means that it does not have a working population to meet its increasing needs and experiences economic losses. Therefore, it should be arranged in a way to increase the productivity of the current working population and to provide the desires and needs of all people in the country, especially the elderly population, the number of products and services they need, and to enable all people to receive high-quality services.

The reasons underlying the proposition of the concept of Society 5.0 and the reasons specific to Japan and the environmental problems experienced by our world also necessitate the establishment of such a structure. The resources of our world are being depleted rapidly, global warming, the extinction of animal and plant species, growing economic differences and inequalities, and increasing terrorism, many problems are pervading all parts of our world today. All these reasons lead to the emergence of many problems, especially the injustices in the areas of income and health in society. The use of technological developments in a human-oriented way and for the benefit of humanity is important in overcoming all these problems.

Although Society 5.0 has been declared as an industrial strategy move by Japan, it appears as a structure that all countries can use and build according to their own, considering the vision it presents and the contributions it will bring. The working population, the decrease in death and birth rates, and the increase in the elderly population rate, which are some of the reasons that pushed Japan to come up with this concept, are one of the main problems of not only Japan but many countries today.

3.1 Reasons for the Emergence of Society 5.0

According to the "World Population Aging 2019" report (UN, 2020) published by the United Nations in 2019, the number of people aged 65 and over in the world is

given in Table 1. According to this table, the East and Southeast Asia region, which includes countries such as China, Japan, South Korea, India, Singapore, Thailand, and Vietnam, represents the population with the highest number of people aged 65 and over. As of 2019, more than 260 million people aged 65 and over live in this generation. It is estimated that this population will increase to 572.5 million by 2050.

Table 1. Population Status 65 and Over by World Regions and 2050 Estimation (UN, 2020)

REGION	2019 65+ Population (Million)	2050 65+ Population (Million)	Change (%)
Sub-Saharan Africa	31.9	101.4	218
North Africa and West Asia	29.4	95.8	226
Central and South Asia	119.0	328.1	176
East and Southeast Asia	260.6	572.5	120
Latin America and the Caribbean	56.4	144.6	156
Australia and New Zealand	4.8	8.8	84
Oceania	0.5	1.5	190
Europe and North America	200.4	296.2	48
WORLD	702.9	1548.9	120

Another important generation for our world is Europe and North America. The population of this region aged 65 and over is over 200 million in 2019, and this number is estimated to increase by 48% to 296 million in 2050.

The most striking image in the table is that the population of Central and South Asia with 176%, Latin America, and the Caribbean with 156%, and East and Southeast Asia with 120% is expected to increase until 2050. If these estimates will realize, it is expected that the world population of 65 years and over will increase by 120% within 30 years and reach 1 billion 549 million.

In the same report, the United Nations analysed the figures for countries with a population of 80 years and over. These figures are presented in Table 2. According to this table, the regions with the highest population of 80 years and over in the world are Europe and North America with 53.9 million and East and Southeast Asia with 48.6 million. Estimates of the population aged 80 and over by 2050, this region of Eastern Europe and North America, and Southeast Asia through the region to reach a population of 177 million, of the population 80 years and over Europe and North America region is estimated to be approximately 109 million. When we look at the world in general, it is seen that the population of the world aged 80 and over will increase by 200% within 30 years.

When we look at the OECD's 2019 data, the data of some countries in the top 50 countries with the world's oldest population are given in Tables 3, 4 and 5.

As seen in Table 3, Japan with 47.3, Germany with 47.1, Italy with 45.5 and Slovenia and Greece with 44.5 are at the top of the list of countries with the oldest population. Spain, Bulgaria, Finland, Switzerland, Canada and Czechia follow these countries in the list with an average age of more than 42. When we look at the population changes of these countries, it is seen that Bulgaria has a decrease of 2.13%, Greece 0.88% and Japan and Italy 0.51% in the last 4 years.

Table 2. Population Status 80 Years and Above by World Regions and 2050 Estimation (UN, 2020)

REGION	2019 80+ Population (Million)	2050 80+ Population (Million)	Change (%)
Sub-Saharan Africa	3.7	12.4	238.1
North Africa and West Asia	5.2	20.3	291.0
Central and South Asia	18.5	62.6	239.0
East and Southeast Asia	48.6	177.0	264.1
Latin America and the Caribbean	12.0	41.4	245.2
Australia and New Zealand	1.2	3.3	168.4
Oceania	0.1	0.2	269.1
Europe and North America	53.9	109.1	102.6
WORLD	143.1	426.4	197.9

Canada and Switzerland are the countries with the highest population growth rate. Canada's population growth rate, which is 3.80%, is followed by Switzerland with 2.79%, Germany with 1.50%, Belgium with 1.47% and South Korea with 1.22%. Slovenia, Spain, Finland, Czechia and France, on the other hand, follow these countries at the rate of population growth, with a slow but increasing trend graphic over time.

As well as the population growth rate of the countries, the birth rate is an important parameter. In this context, when we look at Table 4, South Korea's birth rate declined from 1.24% to 1.05% in 2015-2017; in other words, we see a dramatic decrease of 15.32%. On the other hand, in Canada, the country with the highest birth rate according to Table 3, the birth rate of birth which was 1.56% in 2015 decreased to 1.50 in 2017 and a decrease of approximately 3.85% occurred.

When we look at Table 3 and Table 4 simultaneously, we can say that Slovenia and Czechia are in a rapid rejuvenation process, considering both the stability of the population growth rates and the increases in the birth rates. Slovenia's population growth rate was 0.42%, but the birth rate was 8.57%; Czechia's population growth rate was 0.79%, but the birth rate increased by 7.64% over 3 years.

In another important finding that emerged as a result of examining Table 3 and Table 4 together, Japan and Italy are the only two countries in the world with a negative population growth rate and birth rate. Although the population growth rates of Japan and Italy are the same, the birth rate of Italy is - 2.20%, while Japan's birth rate is at the level of - 1.38%. For both countries, we can say that the problem of rapid aging and the inability to have a young population has arisen.

Table 3. Annual Population Number of Some Countries among the 30 Oldest Countries (OECD, 2020).

COUNTRY	AVE. AGE	2015	2016	2017	2018	CHANGE
Japan	47,3	127.094.745	126.932.772	126.706.210	126.443.180	-0,51%
Germany	47,1	81.686.608	82.348.669	82.656.997	82.914.191	1,50%
Italy	45,5	60.730.585	60.627.494	60.536.713	60.421.797	-0,51%
Slovenia	44,5	5.423.801	5.430.798	5.439.232	5.446.771	0,42%
Greece	44,5	10.820.883	10.775.971	10.754.679	10.725.886	-0,88%
Spain	42,7	46.410.149	46.449.874	46.532.869	46.733.038	0,70%
Bulgaria	42,7	7.177.991	7.127.822	7.075.947	7.025.037	-2,13%
Finland	42,5	5.479.528	5.495.297	5.508.209	5.515.525	0,66%
Switzerland	42,4	8.282.398	8.373.334	8.451.834	8.513.227	2,79%
Canada	42,2	35.702.908	36.109.487	36.540.268	37.058.856	3,80%
Czech	42,1	10.542.942	10.565.284	10.589.526	10.626.430	0,79%
South Korea	41,8	51.014.947	51.245.707	51.446.201	51.635.256	1,22%
France	41,4	66.512.558	66.685.530	66.829.563	66.941.698	0,65%
Belgium	41,4	11.238.474	11.295.003	11.349.081	11.403.740	1,47%

Although only the population growth rate and birth rate of the countries give us general information about the future situations of those countries; these tables alone do not provide important information about the economic and welfare level of those countries. Therefore, in Table

5, the total working population ratio of the countries in the 15-65 age range, the young population under the age of 15, and the elderly population over the age of 65 are given.

Table 4. Annual Birth Rates of Some Countries among the Oldest 30 Countries (OECD, 2020)

COUNTRY	2015	2016	2017	CHANGE
Japan	1,45	1,44	1,43	-1,38%
Germany	1,5	1,6	1,57	4,67%
Italy	1,35	1,34	1,32	-2,22%
Slovenia	1,4	1,48	1,52	8,57%
Greece	1,33	1,38	1,35	1,50%
Spain	1,33	1,34	1,31	-1,50%
Bulgaria	1,53	1,54	1,56	1,96%
Finland	1,65	1,57	1,49	-9,70%
Switzerland	1,54	1,54	1,52	-1,30%
Canada	1,56	1,54	1,5	-3,85%
Czech	1,57	1,63	1,69	7,64%
South Korea	1,24	1,17	1,05	-15,32%
France	1,93	1,89	1,86	-3,63%
Belgium	1,69	1,67	1,64	-2,96%

When we examine Table 5, the highest decline in working population change is Czechia with 2.81%, Slovenia with 2.74%, Bulgaria with 2.05%, Japan with 1.87%, Finland with 1.76%, and Canada with 1.50%. When we look at the rate of change of young people under 15 years of age, the biggest decrease is; South Korea with 6.10%, Italy with 3.32%, Japan with 2.83%, France with 2.59%, Spain with 1.92% and Finland with 1.77%. When we look at the population growth rate of 65 and over countries, South Korea with 11.48%, Slovenia 11.11%, Czechia 7.40%, Canada 7.05%, Finland 6.96%, France 6.46%, and Japan 5.59%.

The most striking feature of these tables is that countries such as Japan, South Korea, Canada, and the Czech Republic have their birth rates, population growth rates, the young population ratio of 15 years old, and the working population ratio is negative, while the population over 65 is increasing gradually and rapidly. Considering that the average age in these countries is around 80, it can be said that the rate of the working population will rapidly decrease over time, they will start to be externally dependent on their economic sustainability. On the other hand, although some graphics are minus in countries such as Germany, Italy, Slovenia, and Spain relatively slow increase in the rate of rising over the age of 65 and the ratio of working population decreasing at a relatively soft rate delays the time of these countries to encounter such problems.

One of the countries with the most striking rates of the increase in the elderly population and the decrease in the young and working population worldwide is Japan. Japan's workforce is rapidly decreasing, thus is faced with critical social insurance costs. Japan's workforce expects to decrease by 70% to 53 million people in 2050. In 2025, its estimate that Japan will face 150 Trillion Japanese Yen in social insurance costs. (Fukuyama, 2018). The decreasing birth rate of Japan and the increase in the elderly population ratio cause the labor productivity of the country to decrease, the need

for a new young population to work in this field increases (Japan Government, 2016; Harayama, 2017).

This situation is not just a problem facing Japan. Thanks to the technological developments in the world of living standards and especially in the field of health, life expectancy has increased, the elderly population has increased, and the working workforce has decreased. Countries are in various searches to solve problems such as the aging of their populations, decreasing birth rate, decreasing population, and decreasing the labor force. Japan is one of the countries seeking solutions to such problems with Community 5.0 (Savaneviciene et al., 2019).

4. THE SOLUTION OF THE NEEDS OF THE AGING POPULATION: THE CPNCEPT OF “SOCIAL QUALITY”

The basic approach of the Society 5.0 concept is that all people lead a comfortable life and create value for people. In this context, the use of the developments in technology not only in the industry but also in the society and living areas, increasing the quality of life, strengthening the social responsibility activities, the elderly population can live a comfortable and healthy life, and the creation of sustainable effective and efficient models for society and social life. (Keidanren, 2016; Fukuda, 2020). In this way, both economic and social development difficulties will avoid, a structure where the people-oriented high quality of life offer will create (Fukuyama, 2018).

With the thinking system that Japan wants to put forward with the concept of Society 5.0, the philosophy of Total Quality Management, the areas of Customer Orientation, Leadership, and Continual Improvement seem to be fundamentally connected. TQM is a universal management philosophy independent of sectors, thanks to this structure, people can use the TQM approach in their social lives. The concept of creating value and bringing the needs of consumers to the foreground, which express as "Customer Orientation" due to its use within the business world, can use with the expression "Human Orientation" when it desires to use it in society.

Society 5.0 aims to provide services to people's needs in the required amount and at the right moment without distinction (region, religion, language, race, and gender, etc.). Successful analysis of those in need (i.e. the segments of society) for this system to work quickly, effectively, efficiently, and above all, in a healthy way; determining their needs, expectations, and desires; value perceptions should understand. The service should provide considering this information. This goal of Society 5.0 is absolutely in line with TQM's Human Oriented philosophy.

Table 5. Some Annual Employee, Above 15 and Under 65 Population Rates Among the Oldest 30 Countries (OECD, 2020)

COUNTRY	Working Population Rate of Countries					Under 15 Population Ratio of Countries					Population Rate of Countries Above 65 Years Old				
	2015	2016	2017	2018	Change	2015	2016	2017	2018	Change	2015	2016	2017	2018	Change
Japan	60.806	60.316	59.951	59.671	-1,87%	12.546	12.432	12.306	12.191	-2,83%	26.648	27.251	27.743	28.137	5,59%
Germany	65.749	65.549	65.254	64.985	-1,16%	13.202	13.315	13.441	13.549	2,63%	21.049	21.136	21.305	21.466	1,98%
Italy	64.388	64.238	64.124	64.046	-0,53%	13.720	13.578	13.432	13.278	-3,22%	21.891	22.183	22.443	22.675	3,58%
Slovenia	70.472	69.885	69.210	68.541	-2,74%	15.323	15.396	15.535	15.677	2,31%	14.204	14.718	15.255	15.782	11,11%
Greece	64.436	64.160	63.916	63.727	-1,10%	14.484	14.437	14.419	14.378	-0,73%	21.079	21.402	21.665	21.894	3,87%
Spain	66.259	66.075	65.918	65.848	-0,62%	15,14	15,080	15,000	14,850	-1,92%	18,590	18,840	19,080	19,290	3,77%
Bulgaria	65.878	65.395	64.955	64.525	-2,05%	13.906	14.024	14.171	14,300	2,83%	20,215	20,581	20,874	21,174	4,74%
Finland	63.435	63.029	62.656	62.317	-1,76%	16.358	16.288	16.199	16,070	-1,77%	20,207	20,682	21,144	21,613	6,96%
Switzerland	67.265	67.098	66.886	66.646	-0,92%	14.861	14.879	14.932	14,982	0,81%	17,873	18,022	18,182	18,371	2,79%
Canada	67.744	67.358	67.025	66.726	-1,50%	16.228	16.245	16.183	16,117	-0,68%	16,027	16,397	16,792	17,157	7,05%
Czech	66.631	65.966	65.318	64.760	-2,81%	15.292	15.478	15.663	15,825	3,49%	18,076	18,555	19,019	19,414	7,40%
South Korea	73.397	73.423	73.124	72.767	-0,86%	13.780	13.379	13.123	12,939	-6,10%	12,822	13,197	13,753	14,294	11,48%
France	62.861	62.594	62.359	62.138	-1,15%	18.505	18.351	18.190	18,025	-2,59%	18,634	19,054	19,451	19,837	6,46%
Belgium	64.810	64.630	64.430	64.236	-0,89%	16.979	16.964	16.953	16,928	-0,30%	18,210	18,405	18,617	18,835	3,43%

TQM has two main areas: Technical Area and Social Area. The Technical Area part of TQM is getting stronger with the implementation of Industry 4.0 applications in the field, businesses evolve into strong structures in the dense competitive environment and the improvement and facilitation of business processes with the continuous improvement phenomenon are implemented with the developing technologies.

Social Area, which is the other basic area of TQM, appears as the segment that feels the disadvantages of Industry 4.0. Expressly, the concerns of the employees about their jobs and the use of Industry 4.0 applications in the work towards the needs of the society paved the way for the emergence of the Community 5.0 concept. A new perspective is needed for new technological applications to become a priority and important in society and social life as well as in the labor market. The concept of Society 5.0 has emerged as a result of these needs.

Elderly population growth is one of the common problems of not only developed countries but also all countries. Many new opportunities are being implemented that enable the elderly population to continue their daily needs alone and increase their life welfare, especially due to the decrease in the rate of working population due to the increase in the elderly population and health expenses. However, adaptation to technology is not as easy as it seems for the elderly. There is an adaptation problem in medium-high technology and above technological devices such as ATM, automatic machines, and internet technologies, specifically smart mobile phones. While this adaptation problem is observed in Baby Boomers and X generations, the issue of not being able to keep up with the technology movement in the Y generation also rises. Generation Z, which constitutes today's young people, will also experience the technology adaptation problems

experienced today when they reach the middle age and elderly category.

For Society 5.0 to implement successfully, it is necessary to use technological developments both to meet the demands and needs of the working population and to take steps to facilitate the lives of all people, especially the elderly population. We prioritize the concept of "Social Quality" to avoid these problems and to prevent Society 5.0 applications from being an "independent" process like the industrial revolutions before it.

The structure of societies is positioned according to their demographic characteristics. The aging of the population, the decrease in the young working population and the increase in the elderly population all over the world will lead to the importance of the service sector. For the elderly population of today and the future to adapt to the digitalized production and service sectors and to implement the Society 5.0 structure more efficiently, it depends on the implementation of education-oriented TQM practices. The concept of Social Quality fills this gap.

Social Quality is an education-oriented concept that has human values at its center and aims to make people have a high quality of life by benefiting from technological developments at every stage of human life and put forward for the successful implementation of technological developments in the Society 5.0 philosophy by combining the philosophies of Total Quality Management, Industry 4.0 and Society 5.0.

With the implementation of the concept of Social Quality, which has a focus on continuous education, in the Society 5.0 applications, it is aimed to increase the technological literacy of the society, to increase the use of technology, and to be aware of technological developments which are high mobility. In this way, it is

aimed that today's elderly population will be able to use technological developments and fully benefit from digitalized services, as well as the elderly population of the future will be able to dominate sustainable technological developments.

5. CONCLUSION

This study investigates the relationship between the concept of Society 5.0, which was introduced by Japan, with the concepts of Industry 4.0 and Total Quality Management, and how the notion of Society 5.0 will affect TQM practices in the future.

In the first part of the study, general information about Industry 4.0 and Society 5.0 concepts and the relationship between them is given. In the second part, the notion of Industry 4.0 was examined, and the effects of Industry 4.0 on Total Quality Management were analyzed. In the next part of the study, the concept of Society 5.0 and the factors causing its emergence are examined and the definition of Social Quality is made.

Industry 4.0 aims to provide a competitive advantage to businesses by using IoT, sensors, information communication technologies, artificial intelligence, and robots, which are the technological developments in the world, and to provide more efficient, effective, and quality personalized products or services for customers. Society 5.0 enables the creation of a society in which people enjoy life to the fullest and where a high standard of living is offered. In this aspect of Society 5.0, we can say that Industry 4.0 applications are used in human-oriented structures, and technologies are humanized and used in social and human-based formations (Salimova et al., 2019).

Every technological innovation that emerges is developed for the benefit of humanity and to enable people to live easier, faster, more effective, and efficient life. Society 5.0 practices centered on human aim both to eliminate the negativities brought about by Industry 4.0 and to increase the welfare level of the elderly population. However, the indispensable condition for the successful implementation of the Society 5.0 applications is to closely follow the technology and to master the digitalized product-service processes. For this reason, the technical competence level of all segments, especially the elderly population, must be increased for the Society 5.0 applications to be successful.

Studies show that elderly individuals adapt to such changes and their resistance to change in technology adaptation is broken over time. The number of active internet users, which was 3.92 billion in 2018, reached 4.13 billion in 2019 and increased by 10% in 2020 to

4.57 billion people (Statista, 2020a). When analyzed regionally, East Asia with 1,102 billion people and South Asia with approximately 817 million people are the regions with the highest internet use, while in African countries located in the Western Sahara regions, it is seen that the internet usage rates increase at the level of 360% annually (Statista, 2020b).

When we examine the rates of internet usage according to the age range criteria, while there was a 5% internet usage rate in each age group as of 2014 in our country, these rates were 42.6% for the 55-64 age range and 19.8% for the 65-74 age range as of 2019 (TUIK, 2019). When we look at the world in general, the number of active internet users in 2019 is 4.13 billion and their age distribution is as follows: 32% in the age range of 25-34, 19% in the age range of 35-44, 18% in the age range of 18-24, 14% are in the 45-54 age range, 10% are in the 55-64 age range, and 7% are 65 and over (Statista, 2020c). The widespread use of technology and the breaking of people's resistance is an essential parameter in this increase, as well as the people's need to use this technology. Especially in developed and developing countries such as Turkey, the digitalization of all state processes and the acceleration of the digital service sector have also accelerated people's adaptation to technology.

Even though the use of the internet and technology, which enables an increase in the welfare of the elderly population, is continuously increasing year by year, digital channels still contain a great unknown in terms of the elderly population. For this reason, beyond the problems of digital devices, the use and safety of these tools are important for the elderly population. For this reason, the provision of continuing education services for the elderly population with the philosophy of Social Quality and the implementation of designs and applications that will provide ease of use should be addressed in terms of enterprises. In this context, it is recommended that enterprises produce social responsibility projects and open training centers where not only practices specific to their businesses but also educations for technological developments in the sector will offer. These applications to be implemented by the enterprises in the transition to the Society 5.0 structure must be supported by the governments and the courses or education organizations are implemented.

Considering that today's young population cannot follow technological development processes closely as they get older and may experience problems in technology adaptation after a while, it is clearly seen that the concept of Social Quality is vital in the practice of Society 5.0 implementations.

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