

COVID-19 and Industry 4.0: Can it be an accelerator for Digital Transformation?

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Abstract

Covid-19 disease will leave deep marks in human history, considering catastrophic impacts and destructions that it has created all over the world and will be one of the important stages of change and transformation for the future. The acceleration of the transition to industry 4.0, which is one of the elements subject to this change and the increasing more than ever effect of digitalization in almost every sector is an important factor appear before us. In this framework, the analysis of the what extent of covid-19's accelerator role for industry 4.0 and digitalization reflects the main purpose of our research. Our research is a compilation study that emerged as a result of examining many literature.

According to the research findings, it is understood that the covid-19 process create a significant leverage effect in the transition to digitalization and that a very important stage has been left behind in the transition to industry 4.0 after covid-19. This research's bibliography predominantly consists of scientific datas and it is thought that this study could be a reference source for the future studies, since the pandemic process maintains fresh and there are not many studies in the literature yet.

Keywords: Covid-19, Industry 4.0, Digitalization

JEL Classification: M10, M19, M30

INTRODUCTION

Before the covid-19 process, the information technologies-ICT investments, which were at the basis of digitalization, differed according to the development levels of the countries and developed countries had a leading role in these investments (Bongo, 2005) but with the covid-19 virus, many countries around the world have had to accelerate their digital transformation, including new business models (UNDP-Eurasia, 2020).

The importance of research

The importance of digitalization in the covid-19 process has been better understood due to its preventive effects on the pandemic, and countries have accelerated digitalization processes. As an examples of among these factors affecting this acceleration, are the expectation that social contact will be reduced thanks to digital tools and applications, and that the speed of spread will decrease (Questia, 2020), despite the economic downturn and recession expectations in the global economy (IMF, 2020), the lower costs of digital implementation and its positive effects on efficiency (WSJ, 2020).

The main purpose of this study is to illustrate the dimensions of the shift to digitalization in the pandemic process, to examine how effectively industry 4.0 and digitalization are used in the fight against pandemic and to see the effects of the pandemic on digitalization by estimating what will be able to happen after covid-19.

Research problem and suggestions

Although many pandemics have occurred in our recent history, such as sars, mers, influenza and ebola, the types of pandemic that have affected the world, such as covid-19, rarely encountered in history (Wikipedia, 2020). The difference of the covid-19 virus from other pandemics is not only the devastating damage it causes, but also due to the fact that the world is in the transition to industry 4.0 (Soto, 2020), digital applications are faster to integrate into every aspect of life because they are imperative, and social reactions are the problem of our study. To simulate what Nadella (2020) has said about digital transformation for longer periods, we can say that the digital transformation process experienced in one year in the covid-19 process has overshadowed the transformations experienced in the last decade (Nadella, 2020). We are still in the process, so it is thought that our research may be a reference for studies to be carried out, especially regarding the post covid-19 process.

Many sectors, such as education, health, finance, tourism, logistics, etc., have been forced to digitize in the covid-19 process, which we will see in the end of our work. Powered by industry 4.0 parameters, digital tools that continue to evolve the benefits are more visible in the covid-19 process, so it is thought that their effectiveness will continue after the pandemic (Mckinsey, 2020). In this context, since the social perception will continue to change after covid-19, it is an important factor for businesses to turn their investments into digital fields, not resist change and to keep them up (Investopedia, 2020).

This study consists of 3 main parts which cover covid-19 relations with industry 4.0 and digitalization, In the transition impact to digitalization of education, health, energy, business management (sales, marketing, supply chain), finance, insurance, travel, tourism, politics areas and expectations and future trends post covid-19. Due to the nature of the investigation, the ethical board permit document is not required.

1. DIGITALIZATION AFFECTS IN COVID-19

In parallel with the covid-19 virus that has affected the entire world, many countries have embraced digitalization in order to reduce physical contact and have tried to minimize the impact on this virus. Digitalization is the process of computer-aided of the information that has been obtained. During the pandemic period, many innovations in the field of digitalization have been implemented in almost every sector. In the following parts of this study, the covid-19 development process, its effects on industry 4.0 and digitalization, and the importance of innovation, impact to industries and expectations after the pandemic will be evaluated.

1.1. Covid-19's Development Process

Although the reason for the emergence of covid-19 disease has not been yet clarified in the days of arrival in late 2020, it is thought that in November 2019, China may have been due to an animal market in Wuhan, Hubei (Wikipedia, 2020). Even though the virus may give a sense of a flu infection in the early days, it has been named severe acute breathing coronary covid-19 disease, which spreads rapidly throughout the body and also takes over the lungs over the next few days (WHO-Naming the Virus, 2020). The virus was declared by the World Health Organization as a global pandemic, due to its spread to Europe through Italy, then from the Americas and the world from China (WHO-Press Release, 2020). The most obvious symptoms of the virus are thorax, back and joint pain, cough, fever, shortness of breath (CDC, 2020), weakness and diarrhea (Gu, Han, & Wang, 2020), loss of smell and taste (Miri, Roozbeh, Omrani, & Alavian, 2020), pneumonia and multi-organ insufficiency (WHO-Q&A, 2020). There were many pandemics throughout history. It is stated that in the Spanish flu in 1918, deaths were predominantly experienced in the second wave of period (BBC, 2020), one third of the world population (700 mio) at that time got infected and about 50 million people died (Duarte, 2020). Although vaccination studies are nearing to end (Anatolian Agency, 2020), nowadays of the second or even the third wave phase experienced, we can say that we have reached 85 million in cases and 2 million in deaths as the number of covid-19 cases continues (Worldometers, 2020). However, there are some obvious differences which we can call positive between the past pandemics and the covid-19 pandemic that we are in. The main ones are the existence of antibiotics and the differences in pharmaceutical technology today (BBC, 2020), the prevalence of social platforms and the faster detection and resolution of problems (Anatolian Agency, 2020), the shorter production of medicines to develop against the disease, the easier management of societies through technological developments such as telephone, television, and the harmonization of the measures taken (Güçdemir, 2020). The first case in Wuhan was also detected through communication technologies. Dr. Li Wenliang, who works in this city, has combined the similarities of the complaints on his patients and then shared the case with all of his fellow doctors via wechat, which we can call China's whatsapp apps, and then found code and diagnosis of the disease with the researches (Körkem, 2020). Even if the harsh measures taken by China at the beginning of the epidemic have been subjected to serious criticism, when we consider the troubles and the number of cases experienced by the world countries in the last year, we can actually say that China is able to keep the losses at a minimum level by keeping it tight at the beginning (Worldometers, 2020). Research revealed that the covid-19 virus varies depending on the air temperatures, weakened at 26 degrees, has reached a halt in its propagation at 60 degrees, and has completely disappeared at 92 degrees (Euronews, 2020). Within the framework of this and similar researches, the virus has destroyed the countries where the hemispheres were located during the winter season, and the outbreak could not be prevented. For example, in March and April, while Europe and the United States were more affected by this virus, while in may, the impact in areas related to warming up weather has decreased, but in southern hemispherical countries, the devastating effect has increased, especially in Brazil (Sputniknews, 2020).

In these days, when the northern hemisphere is in the winter months, the rate of virus propagation has increased unavoidable again (Anatolian Agency, 2020) and shows that the peak levels in the number of cases and mortality can be tested until further vaccines are available, so countries have to implement quarantine measures again. The point is that many of the European, American and Asian countries have begun implementing partial or full quarantine measures, and people have again faced some prohibition and restrictions (Deutsche Welle, 2020).

As quarantine practices are intended to eliminate physical contact, the technological platform, devices and applications where there is no physical contact are undergoing a major transformation in this period, while many industries and economic environments have become destroyed.

1.2. Industry 4.0 and Digital Transformation

Industry 4.0 concept which was first voiced at the Hannover fair in 2011 (Automation, 2014), refers to a major technological transformation such as cyber physical systems, internet of things (Jazdi, 2014), cloud computing, big data, artificial intelligence (Estevez, 2018), integration, simulation, augmented reality, autonomous robots (Industry 4.0 Platform, 2020) that includes sub-components. Within this transformation, all these sub-components have a structure that is closely related to or that supports each other. While the internet of things can be defined as simply the fact that any device is smart and able to communicate with each other (Xu, 2014) but it is actually a simple technological invention of cyber physical systems (Lee, 2015). On the other hand, big data; the size, variety of data, the ability to create new data and the value of the data (Witkowski, 2017) are covered in four sections. While cloud and cyber systems need big data to build an industrial network (Erboz, 2017), the interconnection of that data is what we call integration is all about an integrated mechanism that links and links to each other (Peres & Rocha, 2018). The digital tool that supports and makes it operational is the simulation structure, which provides the optimization of this network by exchanging real time information with artificial intelligence (Silvestri, Forcina, & Introna, 2020). A repository of information is needed to enable artificial intelligence to control and easily reach this data stream. These pools of information, where large data is stored, are called cloud computing (Papetti, Marilungo, Germani, & Peruzzini, 2017). By taking virtual data from cloud computing and participating in reality, mixing it with real time data and integrating this complex data composition into machines, called augmented reality, to enable human machine interaction (Cardoso, Figueiredo, & Gonçalves, 2014). Thanks to this entire chain and flow of information, autonomous robots are becoming operational, interacting with each other and people, creating a large network that simplifies human life in everything from manufacturing to service industries (Djuric & Urbanic, 2016). Within this structure, cyber physical systems protect themselves against external security threats through cyber security mechanisms (Wells, Camelio, & Williams, 2014). Digitalization is defined in Gartner's dictionary as the process of abandoning analogue systems and switching to digitized digital forms instead (Gartner IT Glossary, 2020).

Changes in external world are converted into electrical voltage through sensors and transducers. This voltage is an analogue voltage. These analogue voltages are then converted into digital (Wikipedia, 2020) via digital tools -which is the simulation structure we have mentioned above- and the infrastructure of digitalization is formed.

The digitalization process began to evolve before the industry 4.0 process, and eventually became one of the most important components of industry 4.0. According to the Oxford dictionary, the concept of digitalization was first introduced in the industry 3.0 periods in the 1950s (Oxford-Big Ideas Geography History, 2020) but has been brought to a whole new dimension with industry 4.0 components, strengthened with components such as the IoT, big data, cloud, and increased its effect in virtually every industry. Air-sensitive automatic opening and closing windows in smart home technology, dark-sensitive automated electric system, command closing blind systems, air conditioning, sound or security systems that can be controlled by mobile or other digital devices, weight-sensitive automatic washing machines and dishwashers, robot cleaners and refrigerators that automatically transfer their order to market list are the type of products of this interaction (Roehrig, Pring, & Frank, 2019). All these highly digitized devices are some examples in which analogue datas are converted to digital datas, maximized utilization of industry 4.0 components and depict the most advanced stages of digitalization in today's world. Analogue systems have struggled over time to keep up with the pace of information growth and the move to digital information has led to the mass size of digital information, which has resulted in the creation of a cloud computing system (Wikipedia, 2020). This means that digital tools are not only affecting the industry 4.0 components, they are fed from them, too.

1.3. Covid-19 impact on Industry 4.0 and Innovation

Measures taken against covid-19 outbreak to ensure government and institutions continue to exist serve digitalization. Knowledge management nearly all of the innovative solutions they develop for the continuity of their management contribute to the digital transformation process, the tools that enterprises use for business development, the data they use to minimize mistakes they make to exit the bottleneck they enter (Leask, Lee, Milner, Norton, & Rathod, 2020). Digital transformation is the end result of industry 4.0 components. The pandemic process has also resulted in a need to increase innovation efforts.

The artificial intelligence used in the military field has been transferred to the health sector and become epidemic control, and the medicines used against the virus have been optimized and developed robots have been used for sanitation in all areas. Again, thanks to these artificial intelligence, misconceptions that circulating in social communication tools has quickly identified and were prevented. Particularly, artificial intelligence-AI algorithms have been used more extensively in this process, implementing the tasks human intelligence can perform in many areas, including communications, patient monitoring, communications, heavy industry, manufacturing and logistics, health and medical equipment, education, military communications, marketing, security and transportation. The origin of AI is used in sites that require physical power, instead of people, but it has been used in other sites over time (Ilıcak Aydınalp, 2020, s. 2288).

Many innovations have been introduced in the IoT, which is one of the main building blocks of industry 4.0, as well as AI. By developing the actually used drones, the monitoring of patients, mask, quarantine conditions and fire conditions have been developed to the measurement state, and great achievements in capturing those who are in contact. This innovation has also led to the sanitation of the follow-up, which we call surveillance, from people to machines. Because it's very likely that people who follow up are caught in the pandemic. Fingerprint scanning, temperature measurements through biosensors, electrocardiogram-ECG conditions and respiration speeds have also benefited from many benefits and time savings in this area (Sputnik, 2020). Big data is a set that helps users with the collection and management of millions of data (Wikipedia, 2020). Success in managing such a large set of information has brought a rapid and effective solution to problems. On the other hand, virtual reality has been transformed into a distracting and efficient structure with video conferencing. This has led to faster group operations and reduced travel costs. Digital applications such as amazon web, netflix, cloud apps, zoom, slack, azura, tiktok in cloud computing have been applications that make stressful lifetimes more enjoyable and have a growing their usage area. The Covid-19 process is headed by China in the most effective countries using digital and industry 4.0 parameters. Technologies used in China can be listed as artificial intelligence algorithms, blockchain, cloud computing, intelligent voice scanning system, intelligent image-reading system, 5G technology, 5G patrol robots, drone technology, distance education (Deloitte, 2020). Artificial intelligence algorithms in China are expressed as having managed to resolve the virus's RNA structure much faster and are used to accurately identify the analysis and mutations of cases thought to be positive. Blockchain-related Lianfei technology has developed a pandemic monitoring platform, enabling real-time tracking and traceability of data and minimizing misconception. With a global medixchange program developed by Alibaba cloud in cloud computing, pandemic experiences are being shared with all medical teams. Since some covid patients have a voice change due to flu, more than 1.600 cases of suspicion have been detected thanks to the 580 thousand intelligent sound screening system developed by 3 thousand artificial intelligence robots, and 1.500 hospitals have been read and interpreted with the intelligent image reading system, for example, around 5.000 patients. 5G technology enables remote discussion with patients, and abnormalities in body temperatures have been detected with 5G patrol robots developed by Guangzhou-Gosuncn robotics (Deloitte, 2020).

Developed for the monitoring of patients in China, artificial intelligence systems are the foundation for healthcare innovation, as well as a revolutionary intelligence that can be used in military and other fields, and a color-coded health-grading system is developed with this artificial intelligence. The green color on this system shows virus safe ones, yellow shows those who have not finished quarantine, red shows virus carriers, and the datamatrix code message sends each citizen their own color. Non-green datamatrix code users are externally monitored by drones, robots and camera systems. And even the heat meter and face scanning feature are built into these cameras. In a country with a population of about 2 billion people, the movement and contact points of each individual outside are grouped in certain centers with cameras, the difficulty of collecting and managing billions of cases on the basis of daily contacts and a 30 day period has been overcome by artificial intelligence systems. This makes it easier to intervene with yellow and red contacts in a very short time. These systems were developed to provide 96% accuracy, resulting in data in 20 seconds and virus-bearing people within 15 minutes. On the other hand, the shipment of drugs and medical devices is provided via drone's without contact with the individual (Cem, 2020).

In the Covid-19 combating virus, the need for digital devices has brought many innovations. The more the virus is, the lower the number of attempts, as each attempt in vaccine studies places a significant emphasis on the virus's density and the degree of destruction. A device also developed in Canada has enabled the virus to proliferate to an extraordinary scale, reducing the number of vaccine trials and speeding the production of vaccine (University of Toronto, 2020). On the other hand, the US-based Abbott firm has reduced testing time to 5 min (Abbott, 2020), with a digital device, and in the United States, hospital capabilities have been simulated for the future with an artificial intelligence program developed by the Harvard Global Health Institute.

This simulation provides a timeless map by synthesizing information such as bed capacity, intensive care capacity, risky population over 65 years old, anticipated number of infections, number of beds, equipment and adequate personnel, which also creates infrastructure investments that will be made to ensure patients are delivered to the right hospitals and according to their needs. Singapore, with privacy in mind, moved with bluetooth data instead of GPS data, and detected all users' touchpoints with the tracetogether app. With algorithmic artificial intelligence developed in urban observatories in the UK, online density maps and social distance measurements of public transport vehicles, streets and squares, restaurants and indoor areas were carried out, and the rules taken at the end of these measurements, 50% reduction in traffic density was observed (Deloitte, 2020). As the vaccine is nearing the end of its work, the housing and storage of the vaccine also emerged as a separate problem, For long-term storage, it is stated that vaccines need to be maintained at minus 70 degrees. In Manisa, Turkey, Oztas machine announced that they have developed the digital infrastructure of their earlier production machines and produced a vaccine storage cabinet that provides protection of -86 degrees (Milliyet, 2020).

2.MARKET REFLECTIONS

The covid-19 process has caused devastating destruction in many areas from economy to health, from education to tourism. Governments have implemented stimulus packages to keep economies and society alive while supporting guiding social innovation (Bloomberg, 2020). Despite all the rescue packages and incentives, many sector have been injured but many have had some digital transformations by keeping up with the covid process.

2.1. Education Affects

Due to the risk of infection, in many part of the world, schools have been temporarily closed as a precaution within the framework of quarantine measures, the remote education system has been switched to training via new media and many countries have switched to distance education system du to the outbreak (Yamamoto, Altun, & Özgeldi, 2018). Cambridge university became the first British university to announce that 2020-2021 training will be online, and that small group will continue to educate in order to avoid lost productivity due to online training (The Newyork Times, 2020). There have been significant changes in internet providers that provide educational support in digital platforms as well as schools. One of these, MOOC, in India, received 10 million new member enrollees after 15 March, which translates to a 644% increase over the previous year (MOOC, 2020). In addition to online training, students in schools have provided virtual participation in graduation ceremonies, taking advantage of artificial intelligence systems at these graduation ceremonies, directing students to virtual platforms through tablets on robots, and walking to the podium with controls on video conferences and tablets (Deloitte, 2020). In Turkey, the state schools have used EBA program to online education and ZOOM used many of the programs by private schools. The EBA implementation, which began its transition on 23 March, is 3,1 billion clicks, and Turkey is the most visited 3rd. The website and the World 10. Has been upgraded to website location (Turkey Ministry of Education, 2020). Universities have been switched to online education in march through the higher education institution's online training protocol, and the 2021 education year is expected to continue in this manner (YÖK, 2020).

2.2. Health Market Affects

Apart from the effects of coronavirus on the direct public health, the indirect psychological effects of economic, political and social influences have gradually been a problem. The challenge of individuals to stay at home during quarantine periods has increased the psychological problems of dwelling, stagnation, loneliness (Turkish Psychiatric Association, 2020, s. 3). The shortcomings in many areas during the pandemic period have primarily triggered the identification of problems that need to be resolved urgently in the health sector, intensive investments in health expenditures, and the fact that they are predominantly in the field of digital technology is an unavoidable outcome (Yıldız, 2020). 80% increase in the number of users using online healthcare consultations, increased use of 3D printers for implant production, astronomical rise in emerging health websites, information messages on online emergency and risk situations,

Management of the disease process through telehealth and telemedicine applications, The further integration of data analytics into digital platforms, the use of auxiliary robots in surgeries, the inclusion of mobile applications and the digital tracking of patients, the active health use of drones, the availability of contactless fire and devices measuring heart rate can be referred to as digital transformation themes for this period (KPMG, 2020, s. 23). We are now in the transition of a period during which the process evolved toward digital hospitals, with the state in its care (Turkey Ministry of Health, 2020). During the covid process, many new recommendations for digital transformation have been introduced in the healthcare industry.

These include wearables and the aim of reading people's heart beats, blood pressure and blood values, continuous flow of data such as ecg, echo, and online capture of fire, cholesterol and blood pressure measurements. Studies are currently being carried out in this area and weeks before the disease, we are trying to establish an online data repository (KPMG, 2020). The smartwatches currently in use for these inventions have been the model (Yılmaz, 2020). These new ideas, called new realities, are thought to add a new dimension to the digital transformation of healthcare, with recommendations for underskin digital tools for patient control, referred to as surveillance. Monitoring of the progress of the virus within the body, as well as online patient surveillance (Harari, 2020) is targeted by these tools. This will lead to more active management of social surveillance and social control. On the other hand, suggestions for assistive robots have also been made against psychological problems, it is aimed to share life experiences with these robots, to socialize people under quarantine, to enable them to chat, and to be used actively as an assistant friend in the home (Lewis, 2020). Almost every country, as the virus threatens all humanity, has increased their work on laboratories and pharmaceuticals to get the process through as quickly as possible, and has passed on some sort of mobilization process. In this context, some platforms have been created where countries share the technologies they own (coronathonturkey, 2020). Before pandemic the vaccination period lasts an average of 5 years, and has been reduced to approximately 1 year due to information exchange and technological digital developments (Euronews, 2020). The most important influencing element was the rapid development of digital tools used in laboratories and the rapid sharing of world examples. For example, the Belgian virus reported that they were destroyed in a lab environment and that it was an important step toward the activation of the vaccine (BBC, 2020). In addition, there have been increases in the production and sale of respirator products for patients (Sputnik, 2020), equipment manufacturing for ozone treatment (Hurriyet, 2020), the new generation of disinfectant devices (Haberturk, 2020). In these, attention should be given to ozone generators, which Japanese scientists have said that the covid-19 virus was destroyed by ozone devices. These devices can be 3 times more vivid in the presence of oxygen needed to live by the living people, destroying all living creatures, including viruses, and the use of these devices in homes, businesses and hospitals is becoming more common (Health NY, 2020).

2.3. Finance and Insurance Market Affects

The Covid-19 process has also brought about many transformations in the financial field. Encouraging the use of digital money has been addressed in the financial sector as a precaution. The influencers are that money is risky to go hand-to-hand, that online shopping has been intensifying in the quarantine periods, and that the state has made its aid online (De, Pandey, & Pal, 2020). South Koreans have entered some applications to disinfect their money, such as microwaves, washing machines, etc. (Reuters, 2020) and China has suggested this could be overcome by ultraviolet rays (CNN, 2020). In many public places, payments were made by credit card instead of cash, and the Indian government made debit or credit card payment systems mandatory in some places (Kapoor, 2020). Singapore's DBS bank has announced its shift in foreign trade transactions to the digital platform under contactless banking services. This means that without cash transactions, all transactions will be made online and cheque collections can be made via photos via mobile phones. The bank also declared that it will provide its customers with the necessary training for all of these transactions online (World, 2020). In Turkey, contact-free payments by credit card increased by 3 times, and banks have introduced a digital wallet system to their customers (NTV, 2020). Banks have increased their digital banking activities by moving face-to-face communication based transactions such as account opening, customer advisories to the online system via telebanking. On the other hand, Banking Regulation and Supervision Agency in Turkey, facilitated remote access by deploying remote identification system, while Capital Markets Board of Turkey moved orders for investment products to whatsapp and mail environment, contributing to the process (World, 2020). Banks have also implemented devices that add digital disinfecting modules to ATM devices, allowing the instantaneous disinfection of paper money (Anatolian Agency, 2020).

Covid-19 mortality rates are predominantly above the elderly population and impact gray tsunami (CDC, 2020).

However, the insurance industry has had to implement many digital innovations to continue its routine activities during this process. Examples include promoting products with mobile apps, moving to the home office working layout, making meetings with customers online, moving insurance premiums, payments and policy information to online platforms (Ernst & Young, 2020).

2.4. Energy and Internet Market Affects

With the Covid process, people are fully dependent to the internet as they are closed to their homes and have moved to the home office working order. Internet usage has increased in this period, from varying country to country between 20% to 70%, and in average approaching 50% (Branscombe, 2020).

In China, daily internet usage is expressed as 6,1 hours to 7,3 hours, while Alibaba's Dingtalk and Tencent's WeChat apps downloads have increased by 10 times (Duygu, 2020). This has made it mandatory to make new investments in Internet infrastructures. While these increases in Internet use are not yet a source-side shortage, the growth of industrial activities after pandemic is believed to be a challenge for electricity production. Although the reduction in carbon emissions in climate changes may not be permanent due to covid-19, the return of energy consumption in the rising trend after outbreak may result in global deterioration in climate changes. Therefore, the move to clean energy sources is already being made in post-covid investments, the global citizenship maturity being placed in full human consciousness, the ability to channel investments in battery production and hydrogen carbon capture devices through smart, supportable digital technologies, and new energy recommendations (Biol, 2020). Again, it is stated that in case of transition from large central networks to locally distributed networks against the increase in demand for energy after pandemic, efficiency will increase, network imbalances will be eliminated by digital tools and power distributions can be tolerated (Gordon, 2020). It is believed that digital applications will have a significant impact on energy efficiency. With digital sensors, energy consumption data in buildings and businesses will be acquired via the analyzer and interfaces, data will be transferred and analyzed by artificial intelligence algorithms and, ultimately, measures to be taken with automation and control systems will be prepared. Energy efficiency will be migrated to a permanent process on digital solution platforms with 7/24 online data (Lennart, Blume, Posselt, & Herrmann, 2018). Filtration in buildings and facilities is expected to be sustained, with heat pump, solar energy, more filtered air conditioning systems thought to be preferred, both in the covid-19 process and later by viral transmission of the virus (Conca, 2020).

2.5. Tourism and Travel Market Affects

Tourism is the top of the most affected sectors from pandemic. In 2020, it is believed that at least 75 million people in the global travel and tourism industry could lose their jobs, resulting in a loss of gross domestic product of \$2,1 trillion (World Travel and Tourism Council, 2020) but with new restrictions, this loss will reach \$3 trillion (Bağcı, 2020) is considered. According to the world economic forum's determination, the outbreaks last for an average of 19,4 months and if the effect of this virus lasts longer, it stated that the industrial losses will increase (World Economic Forum, 2020). Due to the pandemic, 90% of the global population is currently subject to overseas travel restrictions, and both domestic and foreign citizens face partial delays in the visa issue (Fragomen, 2020). Meanwhile, the quarantine process brought by the pandemic transports people from city life to rural areas, causing agglomeration in tourism cities (Sputnik, 2020). This collapse and the rise in cases in cities have led travel bans to use the second concept of homes for people going to rural areas. Many individuals have even stated that they can continue their new settlement after the pandemic (Herranz, 2020). With all these developments, tourism and travel companies are making structural transformations, investing in today and tomorrow, trying to avoid the problems they have suffered during this period. To do this, they have increased their advertising on social media and digital platforms and started to better manage their calls with applications like call tracking (Digital Exchange, 2020). On the other hand, some hotels have started to serve with robots to avoid contact with their customers, implementing food models from self-service kitchen model to desk delivery (Euronews, 2020). In Turkey, ultraviolet and ozone devices, digital customer sanitation tools, the use of qr-coded mobile scanning applications instead of the key are listed as other measures taken by hotels (Cnnturk, 2020). Among them, some hotels have also started using disinfecting tunnels developed for sanitation (Haberturk, 2020).

2.6. Business Management Affects

The epidemic process often leads businesses to continue their business as home office, allowing people to purchase their needs from digital media and use more digital tools (Yamamoto, Altun, & Özgeldi, 2018). The Covid-19 process has also experienced conversions in working conditions, the concept of gig economics has emerged, becoming a necessity rather than a choice for remote working (Deloitte, 2020) with flexible working conditions left to employers' preferences.

Businesses that resist working remotely before the pandemic are found to adapt to this process, and this means that the home office working system can become permanent as benefits arise such as satellite office, avoiding rental costs, personnel dining, lowering service costs (Akala, 2020). There are obstacles in front of this permanent situation. One of these is that the employee may be losing productivity. However, with the use of digital business tracking systems, this issue is expected to be resolved (Güven, 2020, s. 252). Pre-pandemic retail sales have been moved from mallstores to online platforms during the pandemic. Many online sales companies, such as Amazon, Migros, Aliexpress, have increased their number of employees for orders. Interest in e-commerce solutions has increased by 1.400% in this period (Anatolian Agency, 2020).

In addition, outdoor advertising, promotion and marketing activities have also been replaced with digital advertising, which has seen an increase in the concentration of push notification, sms, e-mail, pop ups (Öğütçü, 2020). During the period when quarantine measures were removed, some tech stores have opened up their customer service robots. These robots communicate face-to-face with their customers to quickly encode and upscale their information, and group customer demands to help guide effective on-demand teams and get to the solution faster (Robotics, 2020). Sales departments have also been working remotely based on social distance rules, sending and receiving e-mail, conducting transactions via social media, tracking jobs via digital channels, conducting virtual sales or meetings with video conferences. The seminars, which were previously held in the academic and study halls, were provided with online webinars, company HR managements strengthened their digital infrastructure to enable internal communications, refreshed the package programs for online meetings, and accelerated staff outbreak informative and router mail traffic. Financial departments have been able to move cash purchases online, while accounting departments have accelerated the ability to move hand-to-hand invoice deliveries to digital media (Işık, 2020).

Raw material purchases are disinfected and manufactured by ozone generators placed in warehouses in demand chain and warehouse management (Xing, 2020). On the other hand, air conditioner manufacturers have been able to improve their production processes and clean the air with digital sensors in HVAC-heating ventilation and air conditioning system to provide filtered air flow from the outside to the inside (ECDC, 2020, s. 2). Marketing in the logistics sector has been moved to the digital platform as *frachtbox*. Besides, analysis has been made easier in many areas, such as stages, times, of transport, through artificial intelligence programs (World, 2020). On the other hand, delivery with drones in trade, delivery of cargo delivery codes to customers with text messages to prevent contact with cargo deliveries, is other digital applications of logistics (Baş, 2020). Previously, product demonstrations in the exhibition areas were canceled to avoid the risk of a virus becoming a crowded environment, and many exhibition events were postponed to a later date. However, some companies have begun to operate infrastructure such as Virtual fair, VirtualB2B in virtual environments to reduce exhibition costs, take precautions against similar risks in the future and to return to routine activities while minimizing the impact of the virus. This aims to bring thousands of customers and suppliers together in an interactive environment along 24/7 (Şireci, 2020).

2.7. Political Affects

The Covid-19 virus felt its impact in almost every area. In the process, postponing elections on the world has already been an issue (Newyork Times, 2020). However, the need to continue operations in every sector and area has also put these cancellation or deferral recommendations on the agenda and the measures have been increased, continuing to carry out routine activities. As some of these activities continue to be problematic both today and in the future, the idea of a digital environment has become more conversable, with the resolution proposal being able to achieve the result faster. However, the need to continue operations in every sector and area have also put these cancellation or deferral recommendations on the agenda and the measures have been increased, continuing to carry out routine activities. As some of these activities continue to be problematic both today and in the future, the idea of a digital environment has become more conversable, with the resolution proposal being able to achieve the result faster. While the idea of the census being conducted on digital platforms has been the first of these, the full implementation process has not yet been in place due to lack of infrastructure and still need to be completed, such as social planning, address accuracy, single code use, internet availability, physical infrastructure and so on (Thieme, 2020, s. 11). With the digitalization of politics and local administrations, some practice has been taken in this process. Some of these include the use of electronic votes in some parts of the US elections (Kassai, 2020), the digital media of meetings, the functioning of digital parties and membership, the digitalization of election techniques, the execution and analysis of election campaigns (Heywood, 2018, s. 287). The OECD has adapted municipalities, both countries and local governments units, with a broad report on measures to be taken in all areas, highlighting the key points in the transition to digitalization in this report.

This includes the establishment of digital governments, the sharing of the right actions from digital platforms, accelerating digitalization in public health and serve services, the rapid completion of half-digital studies, the delivery of digital infrastructures to rural areas, tracking mobility with digital tools, the introduction of online advertising, education and healthcare, the creation of telepharmacy systems, and delivery of drugs to addresses, It is recommended that patients be digitally informed and controlled, electronic voting, e-negotiation put into use (OECD, 2020).

3. FUTURE TRENDS

The Pandemic process has turned digital transformation into an opportunity. The risks and the importance of human life during this period have highlighted the benefits of the digital world and showed us that after covid-19, there will be a new normal, where nothing will be the same as before, and digitalization will synchronize to all areas (Develi, 2020). The importance of human life and the need to produce it for life have again made the concept of a qualified person with digital skills, the robots, important. The challenges of non-food retail stores, the closed or struggling to survive incentives, have seen that companies with sales explosions in e-commerce can no longer continue to operate as before (Deloitte, 2020). In this context, in the projection where non-food retail stores anticipate developments after the pandemic, people don't want to go to stores as they used to be provisional, concepts such as hygiene and social distance can now create permanent concerns with customers, and paying and waiting for a safe will cool customers in physical stores compared to the past, the ability to provide products at lower costs by spending less effort in e-commerce, as well as the disadvantages that change in consumer habits can bring to an earlier stage, because people see that they can sustain their lives with less non-food consumption, It can lead to people adopting e-commerce as a more usable shopping model due to the benefits of options such as easy returns and door-to-door delivery (Deloitte, 2020). This process demonstrates the need for more value to healthcare professionals, primary school teachers and pedagogues than before, and the importance of digitalization. In an interview with the daily Die Welt, Thomas Straubhaar claimed that digitalization would dominate the post-covid-19 period, rather than globalization, and that the flow of data would prevent the flow of goods (Straubhaar, 2020). Ebulfeyz Suleymanli said that the compulsory isolation of the pandemic process will turn into a social isolation after the pandemic and that people will change their lifestyles, social distance will turn into eased distances, e-business and e-commerce habits will be adopted as the new normal in social life, shopper spurge will slow down, and excise habits will change (Neuropsychiatric, 2020). In an interview with Husayn Kassai Forbes, CEO of the technology company Onfido, who verified people's identity through artificial intelligence systems, said that in the normal period, US voters were 60%, and that the changes in the habits of the pandemic, crime rates, irregularities, transportation, voting, he said the risks, such as election costs, would also lead to changes in this area, saying that the e-vote concept could be the way in which he voted in the judges (Forbes, 2020). Microsoft CEO Satya Nadella stated that in the first 2 months of covid-19 there was a 2 year digital transformation (Nadella, 2020). Erdem Erkul (2020), Microsoft's deputy general manager of investments in Turkey, will see long-term effects on new technologies brought by Covid, transition to the age of online concerts, films and museums, online shopping is a must, and synchronization will increase due to the benefits of school training and working with home office, it has stated that the digitalization of smart sensors will become the core dynamic of it. On the other hand, he said, the benefits of digitalization, as well as the remediation of losses and optimization, are the biggest risk of cyber security breaches when it comes to digitalization (Erkul, 2020).

RESULTS AND SUGGESTION

Every revolution has been turbulent throughout history. In addition, from manual to automatic work, people had a lot of difficulties to move from the presence of electricity, to significant resistance was shown in migration from the village to the city, and factories made significant sacrifices to complete this process. From the industrial revolution of business to the present, many industry processes and turbulent periods have passed. Once the industrial revolution has been considered as the turning point of this process, the covid-19 process has become one of the most important stages, with the multiplier effect for the industry 4.0 process that we have reached it fourth stage, deceiving it, fighting for humanity's existence and memorable features. When we review and consider the above examples, there are strong examples of the pandemic process having a significant impact on industry 4.0 and digitalization, as well as that the virus and the industry 4.0 components are speeding up digitalization. When we review and consider the above examples, there are strong examples of the pandemic process having significant impact on industry 4.0 and digitalization, as well as that the virus and the industry 4.0 components are speeding up digitalization.

Covid-19, where millions of people lost their jobs, increased psychological problems due to quarantine measures, increased virus and psychological diseases, as well as other health problems caused by immobility, damaged social dynamics due to financial problems and caused devastating problems in some areas, given its losses and destructions to humanity, industry has become a turbulent process of industry 4.0. Implementations in particular healthcare and education are a revolution, from digital applications introduced during this turbulent period. We can express that we are going through a process where even the elderly people somehow engage in e-commerce, where corporates have to refine themselves, tourism and travel industries feel more about the impact of this process, and previous store habits are more questioned and new normal synchronization is increasing.

As noted by the World Health Organization and Deloitte, new habits can now become regular habits after covid-19, and digitalization can affect every aspect of our lives. Considering the negative expectations that digitalization will disrupt natural life and increase unemployment, based on the words of Michael Dell, “firms that delay their digitalization and resist the process may face extinction in the near future”, when considering the benefits such as new business areas, productivity increase, more active use of resources, cost improvements, we can draw out the result that the process could accelerate further in the examples given above.

Covid-19 is thought to be enriched by new studies that will be created from different perspectives and the research will be created a model for researchers who will conduct more detailed research in this field, as the process remains fresh and there is not much work in its field at the point of influence on digitalization. There is a need for further examples in this area, and the examples in this study are thought to be an opportunity for new research.

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