

Corona Pandemic (Covid-19) and Information and Communication Technology (ICT): Who Affects Whom?

Aboubaker Khoualed¹, Khayreddine Bouzerb², Omar Saadallah³

¹ Faculty of Economics, Commercial and Management Sciences, Annaba University – Algeria, aboubaker.khoualed@univ-annaba.dz

² Faculty of Economic, Commercial and Management Sciences, Jijel University – Algeria, k.bouzerb@univ-jijel.dz

³ Faculty of Economic, Commercial and Management Sciences, Souk Ahras University – Algeria, O.saadallah@univ-soukahras.dz

Received: 10/2022

Published: 12/2022

Abstract:

The world has been witnessing a global health pandemic, which is the (Covid-19) pandemic, since the beginning of the year 2020, which has had profound effects on various economic sectors, particularly energy and oil, internal and external trade, production and manufacturing, tourism and hospitality, banks and financial markets, information and communication technology, and others. And, focusing on the last sector, we can see that this research seeks to investigate the impact of the Corona pandemic on the global information and communication technology sector, as well as the extent to which modern information and communication technology contributes to confronting and controlling the Corona pandemic. The analytical descriptive approach is used to discuss and analyze relevant statistics and indicators obtained from specialized bodies, reports, and studies.

Keywords: Corona pandemic, virus (Covid-19), ICT, economy, digital health.

1. Introduction:

Since ancient times, the world has been subjected to a variety of epidemics and pandemics. Going back nearly seven centuries, the world witnessed a deadly epidemic known

as the Black Plague, which killed 50 million people between 1347 and 1350 AD. Going back a little more than a century, the world witnessed a deadly epidemic known as the Spanish flu, which killed 20 million people between 1918 and 1920 AD. If we go back more than a half-century, we find that the world was also subjected to a serious health pandemic in the form of the Asian flu epidemic in 1957 AD, which lasted a year and killed a million people. Many modern health pandemics have occurred in the last thirty or forty years, including swine flu, SARS virus, Middle East Syndrome (MERS), acquired immune loss syndrome (AIDS), Ebola, and others.

What the world is witnessing today, at the end of the year 2019, is a new health pandemic that specialists initially referred to as (the new corona virus 2019), and then agreed on the scientific name for it as "Covid-19," i.e. (Corona Virus Disease 2019). It is a respiratory condition. It is of animal origin and is caused by the SARS COV 2 virus, which attacks the respiratory system and causes several symptoms such as fever, coughing, and difficulty breathing, and according to World Health Organization statistics, it can lead to death in 3.4 percent of infected people.

This virus has caused several negative effects and repercussions in various social, cultural, political, economic, and other fields since its appearance in mid-December 2019 and spread in China and then the rest of the world. When we focus on the economic field, we find that most economic sectors have seen sharp declines as a result of the pandemic, including oil, trade, aviation, tourism and hospitality, banks and financial markets, and others, while other economic sectors have seen remarkable prosperity and development. Among the most visible of these sectors is the ICT sector. This is the purpose of this research, which aims to shed light on the global information and communication technology sector's impact on the Corona (Covid-19) health pandemic.

2. Study Approach:

The descriptive analytical method was used to achieve the goal of this study. This is accomplished by debating and analyzing all data, statistics, and findings from previous studies on the issue of the relationship of information and communication technology to the global Corona pandemic, which was accomplished through the desktop survey method and the use of the Internet to access all articles, studies, reports, and research papers related to the subject and issued by international institutions and bodies.

3. The most significant negative human and economic effects of the corona pandemic:

We will give a brief overview of corona viruses in general before discussing the newly discovered corona virus (COVID-19). Corona viruses are a large group of viruses that can cause illnesses ranging from the common cold to more serious illnesses, as was the case with the Middle East Respiratory Syndrome (MERS) and Severe Respiratory Syndrome (SARS) (WHO, 2020).

The coronavirus (COVID-19), according to the World Health Organization, is "an animal-origin virus that infects farm or wild animals and is transmitted to humans through close contact with these animals or their feces, but this virus still needs more research to determine its exact source (WHO, 2020).

According to the American Public Health Administration, the corona virus (COVID-19) is an animal virus that has evolved into a human virus and is spread from person to person. Like most other respiratory diseases, the virus (COVID-19) is contracted from an infected person who has the disease's symptoms (heat, coughing, difficulty breathing), and it does so by:

- Drops generated by sneezing and coughing.
- Caregiving for an infected person is an example of close personal contact.
- Touching your mouth, nose, or eyes after coming into contact with an infected object or surface without first washing your hands (Department of Public Health, 2020)

The Chinese region of (Wuhan) saw the onset of this deadly epidemic, which was first known as the Corona virus and then as (COVID-19), until mid-December 2019. The public fish market was cited as the outbreak's starting point after a Chinese woman in her forty-ninth year consumed bat soup and displayed symptoms of a fatal illness that were initially unknown.

Dr. Li Wenliang, a 33-year-old doctor, was able to identify this deadly virus on December 23 after a medical team thoroughly examined the infected woman. He immediately published stern warnings to his colleagues on his private page. The Chinese government refuted all of these warnings, dismissing them as mere rumors, and threatened to punish all of their promoters. A few days later, Dr. (Li) became ill with this virus and passed away on February 7, 2020, which was also the day the Corona virus broke out in China and began to spread widely (Jandric, P, 2020).

The field of transportation and open aviation at the global level; laxity in taking strict measures to stop the spread of the virus;... and others, which led to the spread of the virus, are among the factors that have contributed to the doubling of the number of infections, the exacerbation of the virus, and its transmission from China to several neighboring countries in a first stage and then to most of the countries in a second stage. Although initial efforts to stop the virus's spread were vigorous, there was a lack of global coordination and a unified strategy to deal with the pandemic.

As a result, the Corona epidemic has grown into a global epidemic that has claimed more lives than the Ebola and (SARS) epidemics, which were estimated to have killed a few thousand people each, or even the swine flu virus, which claimed the lives of 200 000 people. As of June 4, 2021, the Corona epidemic (COVID-19) had claimed 3717518 lives, caused 172917206 cases of infection, and resulted in 155861305 cases of recovery. distributed across almost every nation in the world, with the most affected at the time being the United States of America, India, Brazil, France, Turkey, Russia, the United Kingdom, Italy, Argentina, Germany, Spain, Iran, and China. The table (01) indicates the countries most affected by the virus (COVID-19):

Table (01): The ten countries most affected by the virus (COVID-19) until June 4, 2021

Rank	Country	infection	deaths	recoveries
1	USA	34,174,752	611,611	28,025,575
2	India	28,574,350	340,719	26,597,655
3	Brazil	16,803,472	469,784	15,228,983
4	France	5,694,076	109,857	5,378,299
5	Turkey	5,270,299	47,882	5,139,993
6	Russia	5,099,182	122,660	4,711,982
7	UK	4,499,878	127,812	4,296,244
8	Italy	4,225,163	126,342	3,893,259
9	Argentina	3,884,447	79,873	3,438,437
10	Germany	3,701,690	89,605	3,527,000

Source: (Elflein J, 2020) .

Regarding the most significant effects of the emerging coronavirus (COVID-19) outbreak on the world economy, researchers have gathered a number of statistics and

indicators from official sources that show the effect of this virus on the world economy, which we summarize as follows:

- A global GDP growth rate of -3 percent is expected.
- A terrible drop in international fuel prices, particularly during the peak period of the collapse, as shown in Figure 01 below:

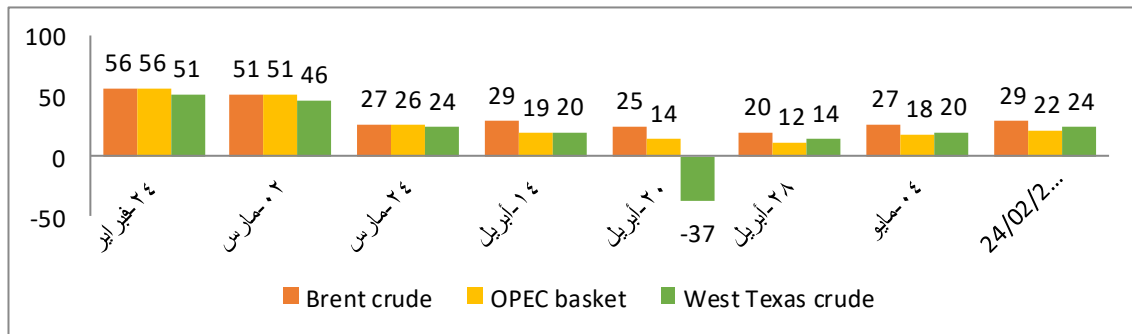


Figure 01: Global fuel prices over the period (February 24, 2020-11 May 2020)

Source: Prepared by researchers based on: (Sonnichsen N, 2020).

- Tourism and travel revenue is expected to fall from \$685,065 million in 2019 to \$474,412 million in 2020.
- Foreign direct investment is expected to fall between (5 percent to -15 percent).
- Most food prices have risen globally, as shown in Figure (02) below:

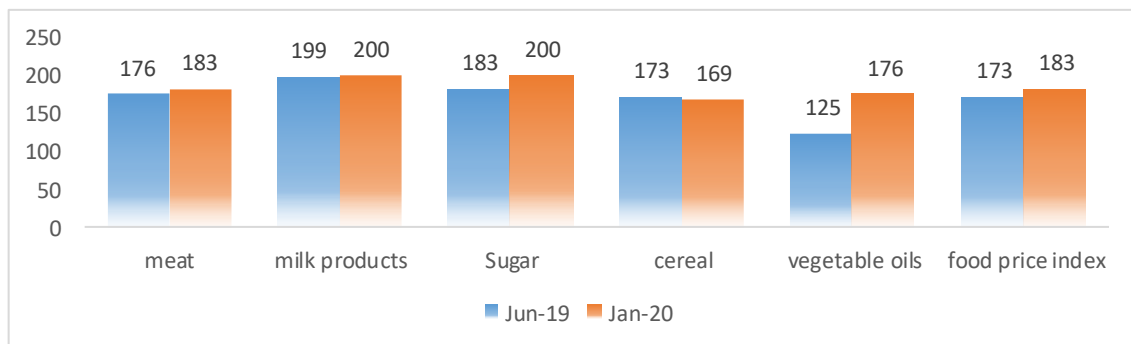


Figure 02: Global Food Index for the time period (June 2019 - January 2020)

Source: Prepared by researchers based on: (FAO, 2020).

- 24.70 million Jobs are at risk of disappearing. (ILO, 2020).
- 547.6 million People are at risk of falling into poverty (OXFAM, 2020).

Finally, the (COVID-19) pandemic had a positive impact on reviving several economic sectors due to increased demand for them, such as the agricultural sector, advanced and smart technologies, the Internet and e-commerce, communications, software development, logistics,

and so on. The spread of this new virus also had a very positive impact on the environment, nature, living organisms, and the climate by lowering pollution levels of all kinds, as a result of a reduction in all harmful to the environment productive, industrial, economic, and commercial activities.

4. Analysis of the Corona pandemic's effects on the world's ICT sector:

The Corona pandemic had a very positive impact on the global information and communication technology sector, which was reflected in the recovery of this sector and its various indicators, and as a result, electronic commerce flourished significantly during the pandemic as a result of the increase in demand for it due to quarantine conditions, as its sales saw a noticeable increase during the pandemic and expectations of a doubling of this rise. Also post-pandemic, as shown in Table (02) below:

Table 02: E-commerce sales and forecasts prior to, during, and following the (COVID-19) pandemic

year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Trillion \$	1.33	1.54	1.84	2.38	2.98	3.35	4.28	4.89	5.42	5.9	6.38

Source: (Sabanoglu T, 2021).

As a result, the number of digital buyers is expected to increase to 2.14 billion in 2017, up from 1.66 billion in 2016. Fashion with \$ 665.6 billion, children's games and entertainment with \$ 585.6 billion, and electronic \$501.8 billion, food and cars \$413.8 billion, video games \$135.8 billion,..., etc. are the most prominent sectors of the e-commerce market whose profits will be increased in 2021 as a result of the Corona pandemic (Kemp S, 2021).

Quarantine conditions and social distancing also had a significant impact on the unbridled growth of digital users, who numbered 7.38 billion people, a 56.4 percent increase over the previous year, with 5.22 billion using smart phones and 4.66 billion using the Internet (Kemp S, 2021).

The rapid growth of digital users has been accompanied by a significant increase in the number of social networking site users, which reached 3.6 billion in 2020 and is expected to reach 4.41 billion in (2025) (Tenkovska H, 2021), and the most prominent social networking sites are depicted in the following table:

Table 03: The most used social networks in the world until October (2020)

Rank	Social media	Users number
1	Facebook	2.701 billion
2	YouTube	2 billion
3	WhatsApp	2 billion
4	Facebook Messenger	1.300 billion
5	Weixin/WeChat	1.206 billion
6	Instagram	1.158 billion
7	TikTok	689 million

Source: (Tenkovska H, 2021)

These users will spend a total of 3.7 trillion hours on social networking sites in 2021, which is equivalent to 420 million years, with an average of 2 hours and 25 minutes per day (and examples of daily time spent using social networking sites can be found in the table below:

Table 04: The number of hours spent per day on social networking sites in a group of countries.

Country	hours
Philippines	4:15
Kenya	3:42
Mexico	3:27
Egypt	3:06
Turkey	2:57
Morocco	2:29
Portugal	2:18
USA	2:07
Hong Kong	1:57
Italy	1:52
Switzerland	1:25

Source: (Salder M, 2020)

Parallel to this, many software industries have seen significant growth in demand, most notably telemedicine, electronic signature, remote lecturing, mobile phone applications,

computer protection software, live video chats,....., and others, as illustrated in figure (03) below:

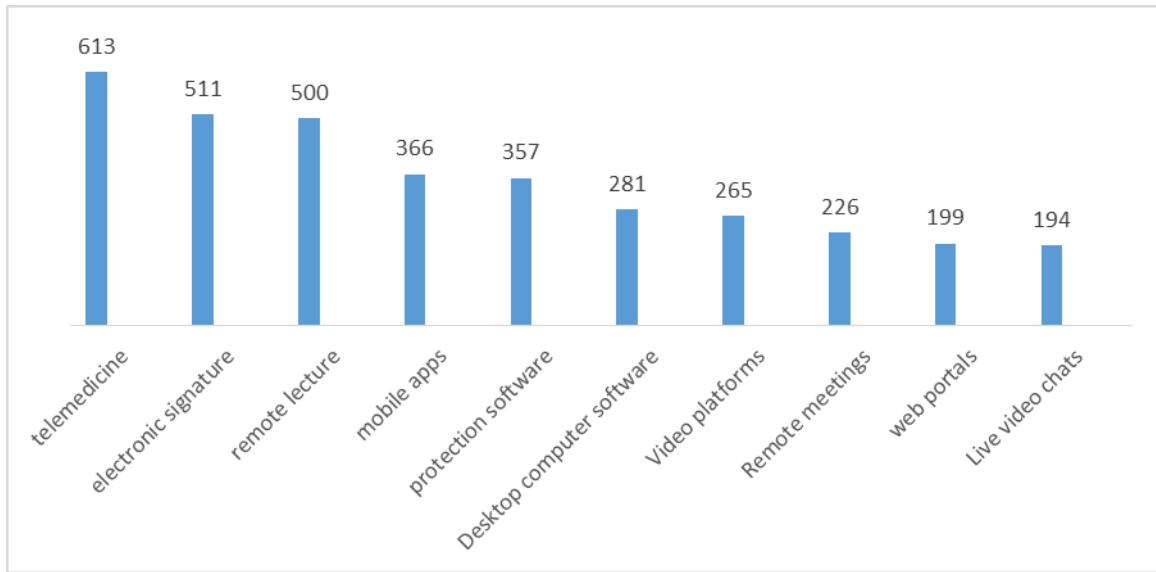


Figure (03): Growth in demand for software industry (%)

Source: (Salder M, 2020)

As a result, many software industries, particularly software: remote lectures, participatory tools and desktop computers, security software, telemedicine,...., and others, have seen significant increases in the percentage of spending on them, as shown in the following figure:

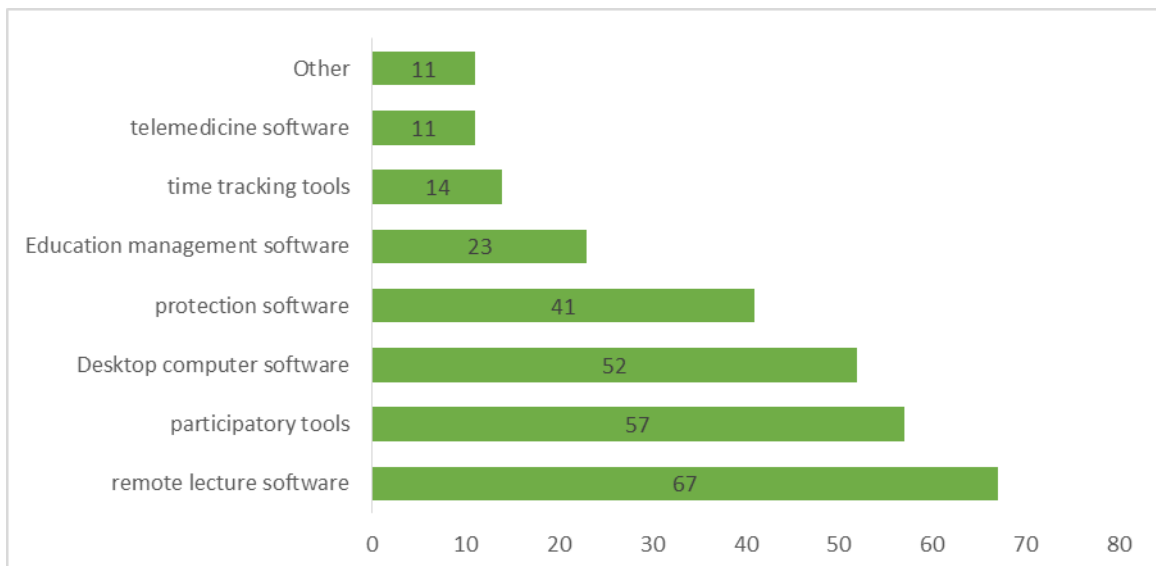


Figure (04): Growth in the percentage of spending on software (%)

Source: (Kemp S, 2021)

On the contrary, many software categories have seen a decrease in spending as a result of the Corona pandemic, most notably marketing, information support technology, project management and sales software,...., and others, as illustrated in the figure below:

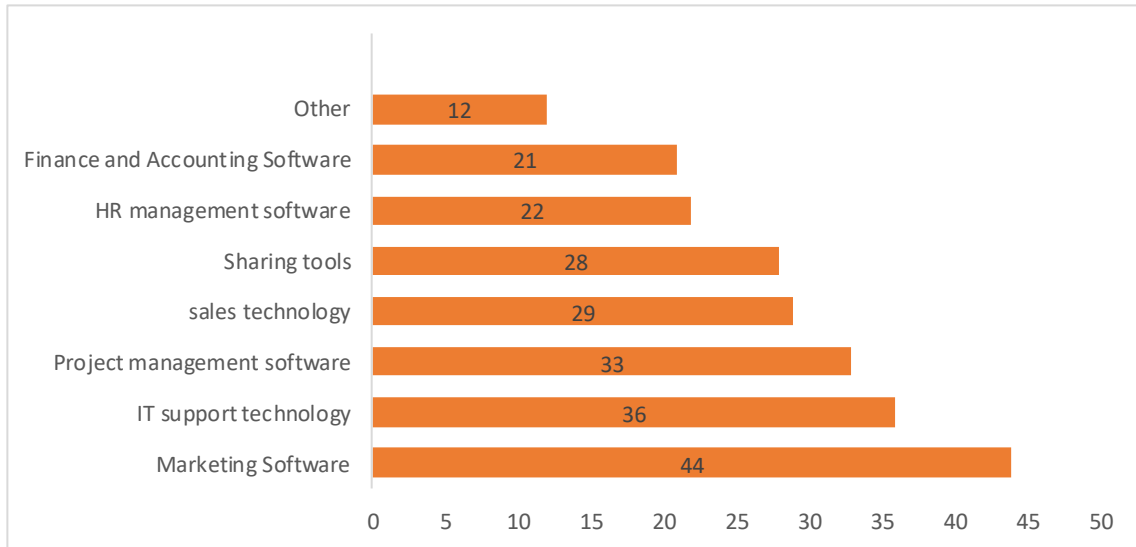


Figure (05): Regression in the percentage of spending on software (%)

Source: (Kemp S, 2021)

As a result of the financial distress caused by the pandemic, global spending on information and communication technology has decreased significantly, reaching \$3.4 trillion in 2020, an 8% decrease from 2019. (Gartner, 2020). Table (05): Before and during the (COVID-19) pandemic:

Table (05): Global spending on information and communication technology before and during the Corona pandemic

ICT	2019 spending	2020 spending	%
data center systems	211.633	191.122	9.7%-
Enterprise Software	458.133	426.255	6.7%-
Hardware	698.086	589.879	15.5%-
IT Services	1.031.578	952.461	7.7%-
Telecommunications Services	1.357.432	1.296.627	4.5%-
total	-	-	8%-

Source: (Gartner, 2020)

This decline was accompanied by a significant decline in the various budgets of companies devoted to information and communication technology within various activities

such as industry (4% - 7%), retail trade (0% - 15%), financial services (5% - 12%), health care (8 % - 15%), energy (0% - 5%), high technology (0% - 9%), transportation (10% - 15%), professional services (3% - 9%), higher education (5% - 15%), the public sector (4% - 6%), and therefore the total decrease in the budgets of companies allocated to information and communication technology was estimated. to be (5% - 11%) .

According to a number of experts and specialists, the return of spending on information and communications technology will be gradual because it will take the most affected sectors—such as the entertainment, aviation, and heavy industries—more than three years to reach their pre-pandemic spending levels.

If the focus is on the information and communication technology sector, it is well known that the Corona pandemic has resulted in significant financial losses for many sectors. We find that most of the IT companies, with the exception of (Microsoft), reported that the pandemic had a minimal effect on their profits. And Apple, which provided expectations for a decrease of \$ 4.7 billion during the second quarter of 2020, provided expectations for a decrease in global communications' profits. Along with (Agilent) company expectations for a decrease of \$ 50 million, (Analog Divices) expectations for a decrease of \$ 70 million, and (Nutamix, Ciena, and Logitech) expectations for a decrease of \$40, \$30, and \$10 million, respectively (O'Dea s, 2020).

5. Information And Communication Technology Role In Fighting The Corona Pandemic:

Initially, information and communication technology played a critical role in combating the Corona virus outbreak by limiting the epidemic and limiting the number of people infected with it. In this regard, one of the most visible applications of information and communication technology in the medical field is the so-called "digital health," which includes everything from devices that provide remote health care and allow doctors to monitor and communicate with any patient infected with the Corona virus around the clock, seven days a week. In this regard, one of the most visible applications of information and communication technology in the medical field is the so-called "digital health," which includes everything from devices that provide remote health care and allow doctors to monitor and communicate with any patient infected with the Corona virus around the clock, seven days a week (My Computer Career, 2020).

Different digital health services have recently gained popularity across many nations, led by Western European nations, the United States of America, South Korea, Japan, and other nations. For instance, the "Internet Doctor" service offered by the operator (Kyivstar) of VEON Company in Ukraine enables the user to obtain a digital prescription that is accepted by pharmacies as well as a consultation with a doctor remotely (International Telecommunication Union, 2020).

In light of the pandemic, the use of various mobile applications has increased in four key areas: health communication, prevention, support, and research. This is because these applications enable strengthening local monitoring systems, tracking rapid communications, supporting clinical practice, and collecting data in real-time, telemedicine, convenient monitoring and control of health conditions,..., etc., all of which contribute to reducing infections and limiting their spread (Teixeira R & Doetsch J, 2021).

In this regard, and in the area of monitoring and tracking infected individuals, South Korea has created a number of mobile phone applications that allow it to track the contacts of infected individuals while also monitoring their movements using the GPS system. Examples of these applications include Corona 100 meters and Corona map. The same method used by Singapore through the (Trace Together) app installed on smartphones, which uses Bluetooth to track people in order to detect infected people and people who had direct contact with those infected during the previous 14 days, thereby reducing the spread of the virus and aiding in its containment.

Big data has been heavily used to combat the effects of the Corona virus, including: forecasting epidemics, epidemiological alerts, tracking and tracing infected people, identifying potential drug treatments, allocating the best amount of resources within the health system, etc. It also involves using remote sensing systems (GPS) to collect, manage, process, analyze, and display geospatial data (Bragazzi N L, Dai H, Damiani G, Behzadifan M, & Wu J, 2020).

In this regard, China has used big data to combat the Corona pandemic with the goal of early warning and monitoring of positive cases of the virus. China has worked to improve medical information and store it in computer network systems and compile a very large amount of medical services data. China also established the so-called hospital information system (HIS), which is a key source of health data in the nation. Hospital management information systems, laboratory information systems, medical image archives and

communication systems, radiological information management systems, and clinical decision support systems are all included in the (HIS) system (Wu J, Wang J, Nicholas, Maitland E, & Fan Q, 2020). In addition, China has used all digital technologies, data, cloud computing, and artificial intelligence to track virus sources and prevent and treat epidemics. This is done in light of the harsh international criticism China has received for its issues with privacy and espionage penetration.

The (Covid-19) virus's ability to remain relatively contained has been greatly helped by cloud computing. Cloud computing is the main force behind remote work, facilitating network access to various physical and virtual resources and effectively ensuring the continuity of activities and services (Nguyen K, 2020). As a result, cloud computing has been used to carry out a variety of tasks and functions remotely, particularly in the fields of health, education, banking, business administration, public services, etc. In the distance education system, for instance, provided by platforms like (Microsoft Teams). among others, (Zoom), (Google Meet). For instance, Microsoft was able to connect more than one million Emirati students in a fully digital experience in just 10 days thanks to collaboration with the Telecommunications Regulatory Authority (TRA) in the United Arab Emirates. This represents a quantum leap in the UAE's educational system (International Telecommunication Union, 2020).

Robots have been reprogrammed to perform a variety of functions and tasks, most notably: reporting cases of virus infection, clinical care, work continuity under the pandemic, automation of laboratories and supply chains, non-clinical care, sterilization, and others. As a result, several countries have developed new uses for robots to combat the Corona virus and limit its spread. A total of 104 robot models, including 82 commercially available models, 11 modified models, and 11 newly designed models, were used, including both ground and aerial robots (Murphy R R, Gandudi V , & Adams J). As a result, a number of nations, led by South Korea, China, Japan, the United States of America, and Switzerland, have created and reprogrammed robots to carry out a number of tasks that support efforts to combat the Corona virus outbreak, including: sterilization and disinfection by cleaning hospital and school corridors, delivering packages to doorsteps, checking that people are keeping safe distances, and more not to mention the valuable assistance it offers in the medical field, such as taking temperatures, giving injured patients medicine, identifying people who are not wearing masks, assisting with virus tests, etc.

We find 3D printing among other contemporary technologies that have been used to combat the Corona pandemic because it enables the quick transfer of technology. Rapid response to emergencies has thus been made possible through technology, which has also been used to create testing tools, personal protection equipment, and even emergency housing (Choong et al, 2020). China's use of 3D printing technology to design and construct quarantine rooms with a distance of (10*10) m² in just two hours, enabling the construction of a significant number of quarantine rooms to accommodate the majority of those infected with the virus in China at that time, is one of the most well-known examples of the use of this technology to combat the pandemic.

The most well-known international firms in the field of information and communications technology made sizeable financial contributions to support the fight against the Corona pandemic by giving grants and subsidies to small businesses, aiding in the production of vaccines, making donations for relief efforts, and giving grants and sponsorships to media companies.

Table (06): The most prominent donations of ICT companies to confront the Corona

Rank	social media	Contribution amount
1	Google	1.3 billion dollars
2	Facebook	243 million dollars
3	Cisco	226 million dollars
4	Netflix	100 million dollars
5	Microsoft	61.9 million dollars
6	Amazon	54.3 million dollars
7	Apple	15 million dollars
8	PayPal	15 million dollars
9	Dell	4.1 million dollars
10	HP	1 million dollars

Source: (Liu S, 2021)

6. Conclusion:

The Corona pandemic emerged at a time when the use of information and communication technology has increased, which has become a necessity in all times. It has been crucial in helping many organizations complete their work in their administrative, productive, financial, marketing, and other fields, and it has even gone beyond that to assist

in decision-making and achieve a competitive lead whether at the level of institutions or at the level of states and governments.

Through this study, it was determined that the Corona pandemic had an impact on the global ICT sector. In this regard, we note: the recovery in the volume and sales of global electronic commerce, the significant expansion of the number of digital users, the significant growth in demand for and spending on the software industry,...., etc. The pandemic had very positive overall effects on the global information and communication technology sector. The pandemic has had a number of detrimental effects on the global ICT sector, the most notable of which may be the sharp decline in ICT spending levels worldwide and financial losses for ICT companies as a result of production interruptions and, occasionally, stops.

The expansion of the use of data science technology, big data, artificial intelligence, and information technology infrastructures, smartphone applications, digital health services, cloud computing, robotics, and others are necessary and effective in containing and controlling the epidemic and ensuring the continuity of work and education. ICT also had a significant impact in confronting the Corona pandemic and mitigating its impact.

The global health pandemic (Covid-19) should be noted as the first pandemic in history where information and communication technology was used on such a large scale to inform people, and maintain their safety, productivity, and communication between them. Whereas this pandemic served as a true test of the ability of contemporary information and communication technology to address health crises and pandemics that humanity may experience, it can be said that this technology has, to some extent, passed the test, but it has also become infected with a new infection known as the "information epidemic," represented in the increasing pace of information dissemination and misleading, which may have more detrimental effects than the initial effects.

7. Bibliography:

- [1]. Bragazzi N L, Dai H, Damiani G, Behzadifan M, & Wu J. (2020). How big data and artificial intelligence can help better manage the COVID-19 pandemic. *International Journal of Environment Research and Public Health*, pp. 01-08.
- [2]. Choong et al. (2020). The global rise of 3D printing during the COVID-19 pandemic. 637-639. *Nature Reviews Materials*.

- [3]. Department of Public Health. (2020, 04 12). *New Coronavirus (COVID-19)*. Retrieved 04 04, 2022, from PUBLIC HEALTH LACOUNTY: <https://www.publichealth.lacounty.gov/media/coronavirus/FAQ>
- [4]. Elflein J. (2020). *COVID-19 cases, recoveries, deaths among most impacted countries as of Jun 04, 2021*. Retrieved 07 04, 2022, from STATISTA: [www.statista.com/statistics/1087466/Coronavirus-2019mcov-cases-recoveries-deaths-most-affected-countries-worldwide /](http://www.statista.com/statistics/1087466/Coronavirus-2019mcov-cases-recoveries-deaths-most-affected-countries-worldwide/)
- [5]. FAO. (2020, 05 07). *FAO Food Price Index, Food and Agriculture Organization*. Retrieved 07 06, 2022, from FAO: www.fao.org/worldfoodsituation/foodpriceindex/en/
- [6]. Gartner. (2020). *Gartner says global IT spending to decline 8% in 2020 due to impact of COVID-19, Gartner Company for Research and Advisory*. Retrieved 07 12, 2022, from GARTNER: <https://www.gartner.com/en/newsroom/press-releases/2020-05-13-gartner-says-global-it-spending-to-decline-8-percent-in-2020-due-to-impact-of-covid19>
- [7]. ILO. (2020). *COVID-19 and the world of work: impact and policy responses*. Geneva, Switzerland.
- [8]. International Telecommunication Union. (2020). *Tech COVID-19:Managing the crisis. ITU News Magazine*, pp. 01-56.
- [9]. Jandric, P. (2020). *Postdigital research in the time of COVID-19. Postdigit Sci Educ* 2, pp. 233 -238.
- [10]. Kemp S. (2021, 01 27). *Digital 2021: The latest insights into the state of digital, we are social Hootsuite*. Retrieved 07 09, 2022, from WEARESOCIAL: <https://www.wearesocial.com/blog/2021/01/digital-2021-the-latest-insights-into-the-state-of-digital/>
- [11]. Liu S. (2021). *Leading tech companies' donations towards COVID-19 2021*. Retrieved 07 15, 2022, from STATISTA: <https://www.statista.com/statistics/1106386/leading-tech-companies-donations-towards-covid-19/>
- [12]. Murptry R R, Gandudi V , & Adams J. (n.d.). *Applications of robots for COVID-19 response. working paper, No.(2008-06976)*, 01-07. Cornell University.
- [13]. My Computer Career. (2020). *The guide to information technologies and its role during COVID-19*. Retrieved 07 14, 2022, from MYCOMPUTERCAREER: <https://www.mycomputercareer.edu/the-guide-to-information-technologies-and-its-role-during-covid-19/>

- [14]. Nguyen K. (2020, 11 18). *Cloud computing during COVID-19 and Beyond*, Experian Information Solutions. Retrieved 07 12, 2022, from EXPERIAN: <https://www.experian.com/blogs/insights/2020/11/cloud-computing-during-covid-19/>
- [15]. O'Dea s. (2020). *Predicted financial impact of the coronavirus (COVID-19) on technology companies 2020*. Retrieved 07 11, 2022, from STATISTA: <https://www.statista.com/statistics/1106359/finacial-impact-coronavirus-covid-19-tech-companies/>
- [16]. OXFAM. (2020). *Half a billion people could be pushed into poverty by corona virus Warns OXFAM*. Retrieved 07 08, 2022, from OXFAM: www.oxfam.org/en/press-releases/half-billion-people-could-be-pushed-poverty-coronavirus-warns-oxfam
- [17]. Sabanoglu T. (2021). *Global retail e-commerce sales 2014 - 2024*. Retrieved 07 08, 2022, from STATISTA: <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/>
- [18]. Salder M. (2020). *How coronavirus impacted B2B software spending*. Retrieved 07 10, 2022, from Trust Radius Inc: <https://www.trustradius.com/vendor-blog/covid-19-tech-spending-data>
- [19]. Sonnichsen N. (2020). *Weekly crude oil prices for Brent, OPEC basket, and WTI 2019-2021*. Retrieved 07 04, 2022, from STATISTA: www.statista.com/statistics/326017/weekly-crude-oil-prices/
- [20]. Teixeira R, & Doetsch J. (2021, 04 20). *The multifaceted role of mobile technologies as a strategy to combat COVID-19 pandemic*. Cambridge University Press.
- [21]. Tenkovska H. (2021). *Global social networks ranked by number of users 2021*. Retrieved 07 10, 2022, from STATISTA: <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>
- [22]. Tenkovska H. (2021). *Number of global social network users 2017 – 2025*. Retrieved 07 10, 2022, from STATISTA: <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>
- [23]. WHO. (2020). *Covid-19 : Questions and answers World Health Organization*. Retrieved 07 05, 2022, from EMRO.WHO: www.emro.who.int/health-topics/coronavirus/questions-and-answers.html
- [24]. Wu J, Wang J, Nicholas, Maitland E, & Fan Q. (2020). Application of big data technology for COVID-19 prevention and control in China: Lessons and recommendations. *Journal of Medical Internet Research*, pp. 01-16.