SOCIAL IMPACTS OF TECHNOLOGY WITH THE EMERGENCE OF IOT, 5G AND ARTIFICIAL INTELLIGENCE

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1.1 Introduction

Some scientists define technology with two main components that of material and intellectual aspects that complement and mix, so that they lead to an integrated meaning of the concept of technology, where the physical part includes all equipment and machinery, and the intellectual aspect includes the rules and knowledge foundations that lead to production. For example, 5G; a mobile technology now in use in certain areas and is still rolling out globally is sought after by many users due to its speed. However, others wonder whether this new technology will come at the expense of health. 5G comes with rates of up to 10 GB per second [1]. Another new technology called cloud computing is setting the standards for new IT systems. Cloud computing offers various services such as Infrastructure as a Service (IaaS), Software as a Service (SAS), etc. Artificial intelligence refers to systems that work in such a way that resembles the human mind.

The more technological innovation develops, the more it appears to influence human lives. In this contemporary world, the use of technology has significantly increased. Besides, there is relentless advancement of technology in all facets of life. While innovation makes life simpler for individuals, it is increasing the complexity of individuals' social life. For example, technology decreases conventional social practices. However, the social orders of today entailed the necessity of technological innovation, which is a form of new information that fulfills the objectives of numerous tasks. Yet at the same time, one wonders whether the social order was brought about due the technological innovations in the first place. If all the social media platforms did not exist today, wouldn't today's generation act and interact like the generations before it. The word technology is made up of (Techno) which implies application and artistry/expertise, and (Logy) which means learning and science. The semantic relevance of the word innovation denotes the techniques and devices that have been created and are available for use. Technology enables the arrangement of a certain social lifestyle as it fulfills the fundamental requirements to network (socialize). The utilization of innovation in daily activities can cause dangers as well as wrongdoings. Given that humans are social beings, it is not surprising that social media platforms took off in a way that no one had ever expected. It can be argued that online communication was a necessity for long-distance social connections, but the problem is that it is also affecting human and family relations that are in close proximity sometimes even in a household [2]. For example, you might have a family in one household each with their own digital devices and communication on social media platforms rather than face to face. It has become a norm for people to think that the utilization of technological innovations is a prerequisite for social familiarity and networking. There are concerns regarding the speed at which current innovation spreads as well as the way it is used and its negative effects. Since instruction is a significant everyday issue, the utilization of present-day advancements makes it an important part of training, not just expansion. This exploration indicates the antagonistic impact of today's technological advances on society. It is expected that it will enhance individuals' mindfulness of the proper way of using technology.

Technology has a huge impact on what it means to be a person socially. A study of students of information technology found that 85 percent of the students who conducted the survey used the

Internet to access social networks [3]. Figure 1 shows the percentage of home internet users globally [4]. Cars will also support the 5G network to connect them to the Internet, each other, and traffic units to form a complete network showing traffic jams, breakdowns, and even the vehicle's location if it is stolen. Home appliances will also get a share of this development. Instead of relying on HUB or Home Assistant connected to a router, then on the Internet, these devices will communicate directly with the 5G networks.

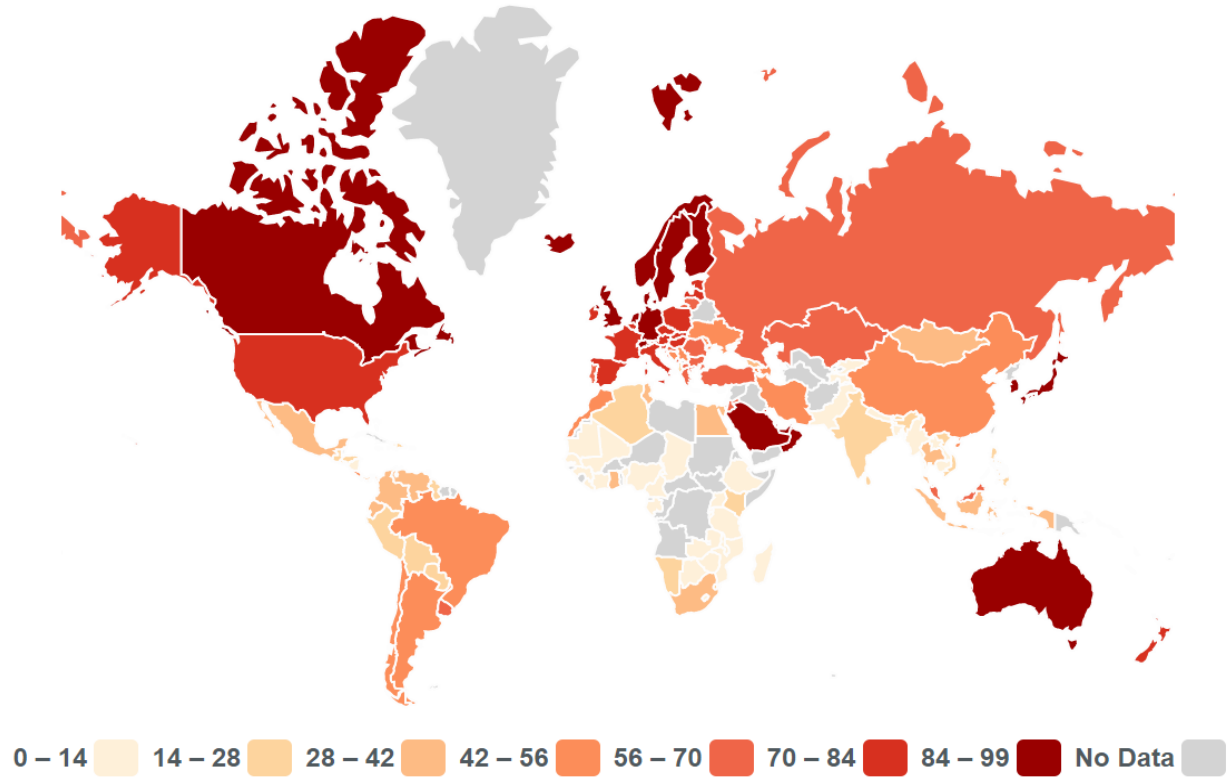

Figure 1. World map with the percentage of internet access at home in different countries [4].

1.2 Recent Studies on Social Impact of Technology

The industry supported by the Internet of Things (IoT) technology aims to produce smart manufacturing objects that can communicate with each other to automate the manufacturing logic and interconnect the various technologies. In the environments of making these interconnected technologies, effective communication is achieved from person to person, from person to machine, and from machine to machine. IoT is a new term for industrialization, such as IT infrastructure, with the goal of sharing information that has a significant impact on the performance of the manufacturing system. The fifth-generation network is the new generation of wireless networking technology, as will provide a better experience for the individual and provide services through faster data transmission. Communication will become more reliable with 5G. For example, the fourth-generation technology allows files to be downloaded at speeds of up to 100Mbps (bits per second), while the fifth generation offers speeds of more than 10 Gbps. This means that the fifth

generation will make a fundamental change in speed compared to the previous generations. Artificial intelligence (AI) technologies support several companies and sectors. For example, in the transportation sector, AI supports transportation vehicles and helps in facilitating traffic. AI is also introduced to the field of health care, as it develops effective and new tools for diagnosis and medical practitioners' support. Back to social networks, massive social apps like Twitter and YouTube have changed people's perception of social interaction. Content is spreading with the press of a finger in all four parts of the planet. Even the big and important personalities are using Twitter to get closer to people, for example, Donald Trump is still tweeting that America is one of the best countries to tackle the Corona pandemic, this tweet reaches millions of people and those who follow Trump in a fraction of a second. This type of communication has become popular with people and made them aware of the latest news and developments. One of the most important activities on social media platforms is media distribution, creativity, and education. E-commerce (Electronic Commerce) is considered one of the most prominent trends in society besides chatting and dating.

Vlačić et al. did a quantitative study in which they investigated the absorbing capacity of organizations when it comes to technology [5]. The researchers asked >600 Croatian firms to fill out questionnaires on technology absorption and the resultant impact. Only 103 agreed to take part in the study. Findings from the study showed that 45 of the firms had absorbed technology and were using it to make work efficient. The other findings were that 34 of the 103 firms largely exported technologies that enhanced work performance. Findings also revealed that technology resulted in enhanced innovation in the workplace. Khosravi et al. investigated the impact of technology on the isolation of senior citizens within the family context [6]. The methodology was Meta-analysis which looked at 6886 relevant articles from 2000 to 2015. Findings from the study revealed that eight technologies are used to isolate the elderly including video games, robotics, 3D virtual environment, asynchronous peer support chat group, and social networks among others. In as much as technology has isolated seniors, it can be used to bring them together as well.

Betts and Spenser (2017) investigated the effects that technology has on young people living in the United Kingdom [7]. A qualitative methodological approach was used in the study. The researchers collected data using a focus-group discussion with children ages 11 to 15 years. A phenomenological approach was used for the data analysis. Findings established that there are several negative effects of technology on adolescents. Findings indicated that the use of social media affects social interactions among children and their family members. Findings also established that the use of social media results in cyberbullying which affects the esteem of adolescents. From these findings, it can be deduced that technology has negative effects more so among young people whose brains are not fully developed. It causes disruption and some adolescents get addicted to the technology.

Rabab Al-Gammal's article featured the effect of new technologies on the example of qualities and good on youngsters in Saudi Arabia to build up an instrument to advance virtues [8]. The creator rose out of the principal objective with the accompanying sub-objectives: Checking,

inspecting, and assessing the connection between the youth and the advanced broad communications by recognizing the force utilization of the new media, the kind of cooperation, inspiration, and the ramifications important to youngsters towards them. The researchers aimed to establish the ethical request of the youths of Saudi- who are comprised of Arab and Muslim youngsters. Clarifying how youth in Saudi manage virtual time established media particularly the web style. The mentalities of youths regarding the rationale for the spread of unethical use of media in Saudi Arabia and other countries of the gulf region.

Sutton, B. did a qualitative study to investigate the impact of technology on education and society. Data were collected through observation [9]. Findings showed increased classroom use of technology such as the use of SMART boards and PowerPoint that enhance learning. Findings from this study also indicated that teachers are not welcoming of the use of technology in class. They are not sure how to effectively integrate technology into the syllabus. Conversely, students were receptive and excited about the use of technology in classrooms. Similarly, findings from [10] which was a meta-analysis established that students in elementary schools enjoy the use of technology in their classes. These are young children who were born in the era of technology and have the potential to fully embrace and utilize digital learning.

Junco et al. investigated the effects that technologically mediated communication has on students' evaluation [11]. Specifically, the effects of evaluating NACADA were investigated. The researchers utilized a quantitative study with a survey design. A total of 4,500 undergraduates were included in the survey. However, the response rate was only 15% with the full response from 706 students. Findings from this study indicate that there was a variance of 18% in people who met with their advisors. The level of student satisfaction with the online advice was insignificant $F(16, 490) = 1.206$, $p = .259$. The other findings were that 61% of students rarely emailed their advisers. These findings indicate that communication using technology is not as effective as one on one. Similarly, the findings by Fartash et al. also found that technology helps in research and the generation of new knowledge [12]. This promotes innovation in the companies and enhances competencies within the market.

1.3 Integration of IoT with 5G

Over the past years, the Internet of Things has created a major change in the world of computing and sensitive applications. The great activity in product lines is expected to grow in the coming years to reach billions of devices. With the emergence of problems in the devices, there is a desire to integrate the sensors with the physical and cyber devices. The fifth-generation devices and the Internet of Things are at the forefront as the devices are expected to form a large part of the fifth-generation model. Also, IoT is expected to change other technologies such as communication from one device to another with smart data analysis. It is also expected that the emergence and extension of cloud computing to the fog model with the use of smart devices to bring innovation into the field. There is already widespread research done on smart devices such as [13-14].

Communications will play an important role in the IoT paradigm in the coming decades. The IoT-5G scenario extends the sensor-based IoT capabilities in other technologies such as robots and actuators for coordination and implementation. It consists of up and downlinks for 5G-IoT connections. The programmers suggested analyzing the machine-type multicast service (MTMS). This is to derive the best design engines by analyzing various business indicators such as energy consumption. One of the most prominent problems that the Internet of Things faces is security because of the proliferation of electronic devices in the hands of people, it requires secure algorithms. about the number of IoT devices was around 7.5 billion in 2015, it reached more than 23 billion connected devices last year [15]. The popularity of the Internet of Things has caused several complex security problems, especially the privacy concerns that make Internet users vulnerable to many risks. These risks include cyberattacks, identity theft, as well as default or persistent passwords, which can create a door for security breaches. Vulnerabilities can be exploited by cybercriminals on the dark web to gain remote access and then mess with hardware. IoT Security is concerned with protecting connected devices and networks in the IoT world. It indicates indicative steps taken to enhance the security of IoT devices and to reduce their vulnerability to attacks from unauthorized users.

1.3.1 Role of Artificial Intelligence in Future Technology

Technology has developed extensively in the field of health medicine, as the world witnessed new uses that earlier generations did not know through artificial intelligence. This is what helped doctors diagnose and detect microscopic diseases [16-18]. AI never replaced the doctor, but rather helped the doctor to achieve the best possible medical care. Artificial intelligence provided technical services that contributed to most of the doctors' accomplishments, as it reduced the psychological pressure that the physician faces and the physical effort in trying to discover diseases. Among the positives of integrating artificial intelligence in the health field are obtaining tremendous ability and tremendous speed in collecting, storing, and easily obtaining information and data among patients, in addition, to complete safety and intense privacy. There is no doubt that artificial intelligence and robotics together constitute the future of the healthcare sector. Middle East hospitals have demonstrated this new reality from its inception and contributed to enabling new and advanced services. For example, one of the regions of Saudi Arabia used Drones to conduct a thermal survey of people for fear of an outbreak of corona virus and follow up on their safety. This is one of the technologies that Saudi Arabia has adopted considering the targeted aspects of artificial intelligence technologies [19].

1.3.2 Model to integrate IoT, 5G, and Artificial Intelligence

Technology is advancing at mind-boggling speed to the extent that technologies of today were not available a few years ago. Some examples of these technologies include Big Data, real-time machine translation, and real-time interactive chatbots that automate communication with a large

population of customers. Another example is the new DeepFake technology which allows the faking of videos in ways that are undetectable [20]. The latest buzz in the world of technology and research is AI, deep learning, and natural language processing systems (NLP) and their applications. Major technology companies depend on them to develop their services, for example, Google relies on them to develop many of its services starting from the search engine passing through the platform YouTube, Gmail, Maps, and even the voice assistant that recognizes the language and provides simultaneous translation. Facebook relies on them to provide recommendations appropriate for users of the application in the news feed, and Amazon relies on them to develop its voice assistant Alexa, and much more.

Deep learning which is sometimes considered a subset of artificial intelligence is sometimes loosely defined as automating human functions. for example, human tasks gained through an experience such as recognizing a cat can be done using machine vision and deep learning [21-22]. The more research done in the field of deep learning the more complex tasks can be achieved. For example, a lot of research is now done on the use of machines equipped with computer vision and machine learning algorithms for detecting and diagnosing a medical condition. Deep learning allows for the training of machines just like you would train a human to complete a certain task. These technologies now make it possible for companies to allow their machines to make instant decisions, make a prediction, and automatically classify certain things. Speech recognition, computer vision, and self-driving cars are the most important areas in which companies use learning.

From 2019 to the present, we have witnessed an increased dependence on artificial intelligence. Companies are keeping up with the latest research developments in the field to be the first to benefit from these technologies. In addition, many large companies have established their research and development divisions in these fields. The ultimate goal of these companies is to produce services and products that improve the user's experience. Figure 2 shows a model for the integration of IoT, 5G, Cloud computing, and AI.

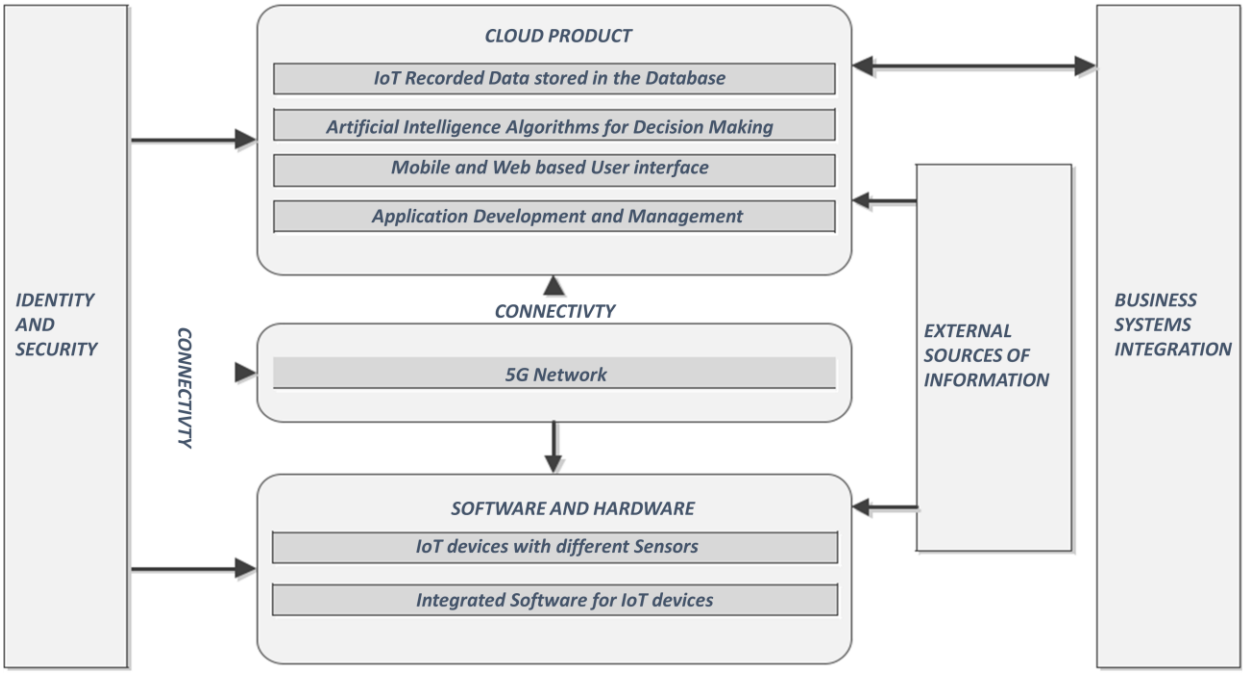

Figure 2. Model to connect IoT, 5G, Cloud Computing, and Artificial Intelligence

1.4 Future Impacts of Technology

The world knows that technology is nothing but a double-edged sword. The great effect that technology has achieved by relying on machines or robots instead of manpower, resulted in decreased demand for humans. In the near future, it is expected that the use of these technologies will elimination the human element even in the most difficult tasks such as medicine and surgery. This will lead to a high rate of unemployment. It is well known that technology occupies the first position in all fields of work, and one cannot do without it. From this standpoint, scientists expect social effects caused by modern technology and from them. First, is the high unemployment rate because companies and hospitals will dispense with the human element and replace it with robots. Second, the world fears that robots more intelligent than humans will be developed so that they do not lose control and be difficult to control. Third, is the emergence of many economic and development projects. Such as the emergence of unprecedented qualitative developments in many areas, the development of the auto industry, and the emergence of qualitative development projects. Fourth, the future of technology will go towards simulation, i.e., remote use. Fifth, that technology will move towards the use of light technology, as telecommunications companies seek to dispense with copper lines and adopt optical fiber cables. Scientists striving to develop a new computer called an optical computer. Light is made up of photons traveling at a very high speed physically to any object, while electrons in electricity are somewhat slow. These changes may cause social effects on the individual, including:

- Increasing the material cost as more devices will be needed in each household.
- Increasing the consumption of electrical energy, given that most modern and advanced devices operate on electric energy. Electricity has become the backbone of modern life.
- Technology has a major impact on the spread of violence among humans, given that most teenagers and children spend most of their time watching combat movies and playing violent games that are easily available in any home and the hands of everyone, and this matter can affect the child's behavior even when he/she grows up.
- Technology is making human interaction something that can be taken out since people can now interact with virtual devices such as Alexa and Siri, in addition to the fact that face-to-face interaction is no longer needed with the advancements in social network applications.

Figure 3 shows a summary of the impact of technology both positively and negatively on the pillars of human life including education, work, family, and health.

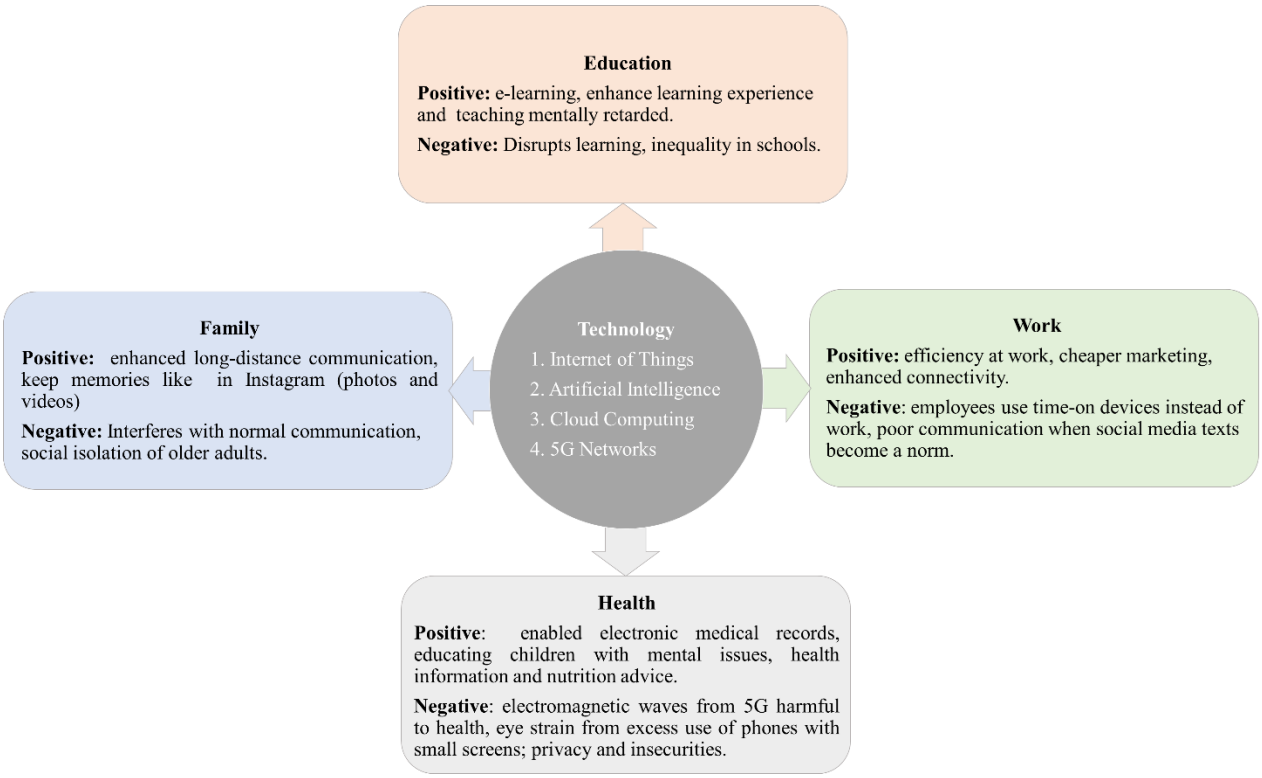

Figure 3. Overview of the positive and negative influence of Technology

1.4.1 People Privacy Impact of IoT

IoT means that it is the new generation of the Internet (the network), which allows understanding between devices that are connected (via the Internet Protocol). What distinguishes the IoT is that

it allows a person to be free from the place; that is, the person can control the tools without having to be in a specific place to deal with a specific device. It has a great impact on companies as it has the potential to stimulate the innovation sector and improve the efficiency of individual companies in pushing the market towards a clearer focus on innovation. As an example, the smart doorbell technology can be likened to a strong guard dog on the one hand, and a reliable digital receptionist on the other. In addition to informing the person audio and through the smartphone of the activity taking place at the door, the bell records all kinds of movement events in the electronic cloud, to allow viewing these videos (along with the videos recorded directly) on digital devices at any time. A study showed that people can be uniquely identified through e-mail, their nationalities, and their place of birth. Data that seems unidentifiable can easily be found using reverse engineering methods. Paraskevopoulos et al. expressed how most of the population can be determined from the behavioral patterns revealed by the site data from mobile phones, by analyzing the mobile phone database of approximate sites based on the closest cell tower [23].

1.4.2 Impact of Wearable IoT and 5G Devices

IoT technology is not immersed in many fields including health. Below are some of the impacts of these technologies within the health field.

1.4.2.1 Control of Smart Sensors

One of the recent experiences that they have tried on patients who suffer from complete paralysis is the use of smartphones or modern computers to sense the thinking, ideas, and tasks they want to do through sensors that are cultivated in their brains. Stanford University announced that they had succeeded in previous experiments with sensors implanted in the brain. This allows such patients to think of things and the machine can directly translate or implement them. For example, they can think of words and the machine will be able to say these words allowing these patients to communicate. They can also think of tasks such as the movement of fingers and hands and an attached robotic hand can do these tasks. There are many examples, and this field of research is making a huge impact not only on patients with complete paralysis but also on patients with other medical issues. When this technology is fully viable, it can be used by healthy individuals to implement tasks such as driving through their thoughts.

1.4.2.2 Improved Patient Care

The advance in technology such as the 5G speeds will allow for real-time time reliable communication. This communication will allow patients to communicate with healthcare providers to have their concerns and questions answered on the spot. This will also allow the development of IoT devices that connect to the patient and communicate directly with the

healthcare provider. These technologies will also allow for home medical care which will ease the pressure on hospitals and might reduce the cost of healthcare.

1.4.2.3 More Accurate Diagnosis of Health Problems

A more accurate diagnosis of health problems is the most important which means IoT devices for measuring pressure, sugar, and heat. Early diagnosis is very important as it reduces the problems of surgeries and the appropriate treatment method. Therefore, research is ongoing for technological devices that can accurately diagnose health problems without human intervention. This will pave the way for technological devices that will in many areas replace human medical personnel.

1.4.3 Economic Impacts of IoT and 5G

The 4th industrial revolution is at high speed which means achieving more unprecedented innovations and achievements in several vital areas, such as artificial intelligence (AI), smart cities, and the Internet of Things (IoT). This would radically transform how societies operate, advance economic development, support digital plans for countries, and contribute to creating a more connected world. One of the main factors behind this revolution is the empowerment of the fifth-generation mobile networks. Thanks to the high speed, which is 100 times faster than the current 4G LTE network, in addition to the high reliability, mobile-to-mobile (M2M) communication technology, and limited energy requirements, the fifth-generation networks herald a new era in the world of mobile communication. This generation's network outperforms the capabilities of previous generations by providing unparalleled speeds that allow unprecedented communication speed in a very limited time that cannot be observed, which will enable networks to support entirely new services and applications, many of which are characterized by their ability to significantly improve the quality of life throughout the world. According to the Global System for Mobile Communications Association, it is expected that more than 1.2 billion communication channels will be operating over 5G networks worldwide by 2025 [24]. To keep pace with the ever-increasing traffic while offering higher bandwidth, 5G technology requires larger blocks of contiguous spectrum and bandwidth. Therefore, it became necessary to spread the telecom towers more in any telecom market seeking to operate the 5G networks. With 5G network technologies are expected to contribute $2.2 trillion to the global economy over the next 15 years [24]. It is imperative that governments and mobile operators ensure the right infrastructure to take advantage of the huge opportunities looming Tower companies have succeeded in overcoming the challenges facing emerging markets by keeping up with a five-dimensional model, including the participation of towers and sites, lease agreements, construction of new sites, acquisition and re-lease of existing telecom towers, providing coverage solutions, Smart distribution of antennas inside buildings, in addition to, connecting towers to the optical fiber network. Given the large number of towers required for the efficient operation of 5G networks, the logical step to make this possible and effective is to use the existing infrastructure. This can be achieved through tower rental agreements

and their participation by other telecom operators to increase the efficiency of utilizing the existing towers while installing additional equipment when needed to improve their network capabilities.

1.4.4 Social Impact on Human Life

It is undeniable that organizations looking to adopt IoT are driven by the need to gain a competitive edge over other players in the industry. For this to be successful, management approaches also have to be fine-tuned and innovated in such a way that communicating physical objects will go hand in hand with network management teams. According to Tarabasz (2016), network management is a formalized and constant dependency on relationships, meaning that this network will be viewed as a dynamic solution [25]. This solution would be an ad hoc creation by clients applying available products and applications of companies. Through this approach, companies will be able to introduce new and unconventional ways of thinking, thereby, fostering competitive advantage through flexible management, versatility in approach to leadership, and access to new business windows and opportunities. While this line of argument does not focus on the social impacts of IoT, it dissects the management of people, which loosely borders on the assessment of people's social norms and behaviors.

Perhaps an overlooked or ignored avenue of the IoT entails the myriad ways in which it can be socially used. According to Zeeuw et al. (2019), such forms as internet skills and capital, form the basis upon which different types of uses of IoT can be attained [26]. Furthermore, the interconnectivity and open nature of IoT implies that communication is open. Hence different modes of social communication. The authors argue that the social use of IoT by different types of people informs the understanding of people's behavior in terms of creation, maintenance, and absolution of social relations in a society linked through networks. Key indicators of the abovementioned statement are entrenched in the inversed effects of income, social capital, education on personal use, as well as information on sharing of IoT data with a third party or a partner. These varying uses and factors that determine the indicated uses to highlight the existence of different social uses of IoT. The authors conclude that the different designs of the internet and capital skills determine the social use and application of the Internet of Things.

It is important to note that the social impacts of any phenomenon will eventually have an impact on the economy of a given country. The primary impact of increased consumption of IoT is an increase in internet usage [27]. It goes without saying that in the current world of business, the internet is a crucial component, thanks to the ever-increasing need for convenience by consumers. The authors acknowledge the fact that an increase in internet usage and the adoption of the IoT will pose challenges regarding data ownership and unlimited communication and intrusion. Their take is that an increase in IoT usage and overall internet usage will result in a direct bolstering of the economy, especially with more accurate data on consumer behavior.

While an improvement in the economic status of a country or entity would likely result in a compromise in the social norms of the said country, sustained approaches of mitigation and management can be deployed to ensure that these challenges do not have long-standing effects on

a social sphere. The authors hold that the five major components that make IoT tick are the storage of information, collection of information, communication, processing of information, and action performance. When these factors are seamlessly fused with the right regulatory observations, both social and economic aspects of a country are strengthened. The interconnection of homes, transport systems, business activities, communities, and the government results in the creation of a one-stop-shop ecosystem, where people can access anything, they need in almost real-time. Therefore, social interactions will be boosted as economic prosperity is achieved.

Wielki (2017) claimed that the impact of IoT stretches far beyond organizational restructuring and economic improvement through an increase in sales [28]. He holds that the Internet of Things will trigger operational improvement in the sense that organizations will come up with newer business models that will be used to enhance operations and maximize profits. More specifically, the IoT will present opportunities for organizations in two major ways: the transformation of regular business processes and the enabling or creation of new business models.

The author further notes that the paramount areas of exploitation and success for the IoT will be the installation of sensors into smart products, thereby enabling organizations to track the health, usage, operation, and external environment of the product. It is imperative to note here that despite the tremendous economic improvement that this sensor installation will have on the products of a given company, the social downside is that it will keep track of the consumer, causing unwarranted and unauthorized intrusion into the private life of the customer or client using the product. Besides, the fact that this product can be remotely controlled suggests that companies can use the product for whatever intention they may harbor.

1.5 Discussion and Analysis

Based on research and arguments brought forth by select scholars, it is evident that the IoT, 5G, AI, and cloud computing have both overwhelmingly positive, and negative impacts. From a spectrum of simplicity, IoT facilitates the connection of people, objects, companies, governments, and societies through technology. The key emerging factor from the above review of research material is that economic and social impacts usually overlap. Given that it is mostly viewed from a business prism, this concept entails five major components that must work together seamlessly for efficiency: identity and security, cloud, connectivity, external sources of information, and business systems integration. A combination of these factors results in an astute IoT that can be used to bolster the economic and social facets of human life.

Based on the reviewed research, the general impacts of the IoT can be condensed into process monitoring, management of data, accurate prediction, and access from anywhere. From an economic angle, these factors facilitate proper and accurate collection of information on clients, sustained monitoring of product performance and purchase trends, near-accurate prediction of consumer behavior in forthcoming periods, and the ability to offer customers convenience since products or services can be accessed from any given location. Based on these factors, organizations and corporations that adopt IoT stand to make massive profits because of improved

operationalization, better business models, better monitoring, and increased sales because of the prediction of consumer behaviors.

Socially, the impacts of IoT, 5G, AI, and cloud computing can be broken down into positive and negative effects. On a positive scale, IoT facilitates quicker and easier communication, implying that it becomes easier for people to form social relationships even when initial interactions were business oriented. The fact that homes, schools, social amenity avenues, workstations, and the world at large can be connected, means improved and increased communication in real-time, hence better relationships. As noted above, human beings exist in an environment by forming relationships through social learning. This learning process, if done properly without unnecessary intrusions, results in strong relationships. Dating, for instance, can be massively improved through the internet of things, especially when sufficient data and information is collected about a person's habits, preferences, and tendencies. The internet, through this connection, could also be an avenue for educating the youth on positive societal behavior and expectations [8]. Numerous other social concepts can benefit greatly from increased and improved connections brought about by IoT.

Conversely, the phenomenon also has far-reaching negative social impacts that can be wholly tied to data ownership, security, and privacy. For most people, individual privacy is not considered when companies collect information and data about them. Worse still, companies make products with sensors that can be controlled remotely, meaning they may easily be used for 'spying' on consumers. Given the unauthorized and unrestricted access to personal data through IoT, social relationships are highly likely to be compromised because people would rely on data rather than natural trust when interacting with one another. The foundational principles of any social relationship revolve around mutual trust, human touch, and the element of surprise. The use of IoT to study one another would mean that people perceive each other statistically or in a robotic fashion. Besides, families have been disrupted, thanks to the excessive use of technology and the internet to the extent that normal face-to-face communication becomes scarce [29]. The inevitable result of such an occurrence would be the collapse of normal social interactions. This is in addition to the danger of some individuals' tendencies to socialize with virtual devices such as Alexa or Siri rather than socializing with real human beings. This could become a real danger in the future when such virtual machines are advanced to the extent that they can hold a real conversation. To our knowledge, this technology is still in its infant stage and the social impact remains to be seen. A downside to technology is that for now, it cannot be successfully used to teach mentally students with special needs such as mental illness. When it is used for regular students, it provides avenues for distractions, bullying, and other non-educational ventures. Besides, IoT can be socially used in a myriad of ways, depending on the internet and capital ability. On this basis, it goes without saying that this connectivity could easily have negative repercussions, especially if users harbor malice. Cases of cyber-bullying could increase, and online fraud, attacks, and even identity theft could be on the rise because of increased connectivity through 5G and IoT [30]. Young people engaged in such crimes would also face jail terms. Therefore, it suffices to state that proper and more stringent

regulatory measures have to be put in place to ensure that the feared social impacts do not materialize.

1.6 Conclusion

The modern world is on an upward trajectory in terms of consuming and relying on technology. The continuous improvements in connectivity and network enhancement through IoT, 5G, cloud computing, and artificial intelligence means that the world is continuously becoming one tiny ecosystem. Better human interactions through real-time and accurate data mean that everyone lives in one huge bubble. As discussed throughout this chapter, this concept has numerous positive impacts, including better communication and heightened profits for businesses. However, the downside is tied to the absence of strong regulations to ensure that data security and privacy principles are adhered to. To truly realize the eye-watering benefits of IoT, governments need to ensure that personal information and data are properly protected against misuse, improper exploitation, and even identity theft. When these factors are taken into consideration, the IoT will fully revolutionize the world in a beneficial way. Till then, it is impossible to only guarantee the positive impacts of this phenomenon. On another hand, the chapter concentrated on the social impact of technology. The social impact of technology can either be positive or negative. Positive impact can include the use of technology in classrooms, as a means to gain knowledge, as a means to help patients, and other uses. However, there might be negative social impacts which include decreasing family and general human face-to-face interaction, changing the behavior of youth, lack of privacy, etc. The negative social impacts of technology are already seen in today's society, and it remains to be seen how this impact will increase and what its long-term effects might be. The field of IoT and new technologies impact is being explored in other domains such as IoT-based smart cities on human life as well as other domains that are being explored in recent literature. Humankind must pay attention when it comes to technology and its impact and research should be continuous in the domain of the effect of technology on all aspects of human existence.

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