

ICT and COVID-19 Era: Effect on Nigeria population

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Abstract

The Covid-19 era was an eye-opener to many sectors across the world, Nigeria not an exception. It disrupted the normal way of doing things, and many of those sectors had to find alternative ways to survive. Among the highly affected sectors include the health sector, the education sector, the ICT sector, the transport sector, and others. All these sectors had to rely on ICT, innovation and creativity to survive the pandemic. Covid-19 led the Nigerian government to issue directives of closure and lockdown. This meant that international travel was put on hold, going to work physically was also halted to avoid the virus's spread. Companies in Nigeria had to get alternative ways to have their employees work from home and still deliver quality work. Schools in the country had to look for ways to keep their pupils and students actively reading despite not engaging in physical classes. Places of worship that were also largely affected had to look for ways to have their members engaged over the period of closure and lockdown. Covid-19, whose spread is majorly through physical contact, meant that doctors and other healthcare workers were at great risk of contracting the virus. Therefore, the Nigerian government through the ministry of health had to look for alternative ways to handle patients without physically coming into contact with them. The ICT sector in Nigeria became the only place to run to, to have most of these multi-sectoral problems solved. Creative innovations had to quickly be made to intervene or else have several sectors stall. Most of those innovations will, however, be carried on past the Covid-19 era.

Keywords: *ICT, covid-19, innovation, technology*

Introduction

The Covid-19 season was an unexpected season that came with a fair share of challenges. Part of those challenges was the disruption of the normal activities around the

world and Nigeria was not an exception from most of these challenges. The entry of Covid-19 into the country meant the disruption not only of the economy, but also different sector that contribute towards an upright

economy in Nigeria. Certain sectors were either affected positively or negatively depending on their roles and contribution to the economy of Nigeria. The manufacturing sector, the engineering sector, the transport sector, the ICT sector and the education sector being some of the most affected sectors by Covid-19. However, despite the adverse effects Covid-19 had on most of these sectors, there were advanced changes that were spearheaded by ICT and some of these changes helped the Nigerian economy back to normalcy. The changes affected close to all sectors and have been a good run for the Nigerian government and the economy. This paper identified the most important factors that influence economic growth through ICT sectors in Nigeria

Manufacturing

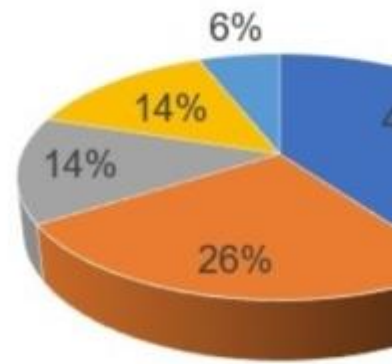
The manufacturing industry in Nigeria has been one of the most endangered sectors during the pandemic. The Nigerian government and different sectors had to survive on new and innovative ideas to mitigate the effects of the pandemic on its citizens and the economy. It was even more important for the medical technology industry through the Ministry of Health, to be more involved through the process to help develop equipment that would

help in effective handling of patients (Baldwin, et.al, 2020). The medical technology industry in Nigeria, popularly known as the Med-tech industry, had to come up with better ways to diagnose, treat and monitor patients. All this could only be effectively done through creative innovation. Medical engineers in the country through the support of the Nigerian Ministry of Health had a role to play in making sure that they think and produce equipment that would help in making work easier and at the same time more efficient for medical practitioners across hospitals in the country. This equipment had to be sustainable, and that would go for a long time (Baldwin, et.al, 2020). Among the machines introduced into the medical world were testing kits and other automated machines, which were used in testing covid-19 and carrying out basic functions across healthcare facilities. Some of those machines used artificial intelligence and were highly dependable because they reduced contact between healthcare workers and patients and can also carry crucial information about patients (Kumar, et.al, 2020). Unlike when there was a need for extra human labour across healthcare facilities, these machines have come to reduce the need for extra human labour and instead have mechanized treatment.

Engineering

Engineers in Nigeria played a great role in making sure that there was sufficient innovation across the country to help in dealing with the pandemic. The engineering sector in Nigeria was one of the most engaged sectors used to in coming up with equipment that would help solve the Covid-19 menace and ensure that all other sectors were comfortable and working effectively. The post-pandemic era in the country will also highly depend on engineering works to sustain what was started during the pandemic. The massive production of machinery, especially in the health sector, will depend on major improvements and maintenance past the pandemic (Baldwin, et.al, 2020). Certain areas in different sectors still need to be worked on, and therefore, engineers still have work to develop innovative works to solve certain problems within the different sectors in the country.

Fig 1: A Pie-Chart showing the impacts of Covid-19 on engineering in Nigeria.



- Stronger domestic supply chain
- Increased adoption of automation
- Enhanced climate of collaboration
- More nimble approach to design
- Improved public perception

Source: (Whitelaw et al. 2020)

In Nigeria, engineering and construction sectors are also major players in the post-pandemic era. The pandemic was an eye-opener for the Nigerian government and the different sectors within the country on their preparedness to deal with pandemics. New healthcare facilities over the pandemic had to be constructed to accommodate the high numbers of infected persons within the Nigerian population. Covid-19 through regulations issued by the World Health Organization required that patients be isolated for specialized treatment and close monitoring (Baldwin, et.al, 2020). However, healthcare facilities in Nigeria did not have the

capacity to meet the demand of patients streaming in for isolation. Hospitals in the country needed a higher bed capacity and facilities that could help in isolation and special care. More facilities to deal with health-related problems apart from covid-19 were also required. The Federal Ministry of Health through the leadership of Dr OsagieEhanire settled to improvise healthcare and isolation centres in stadiums to meet the demand from the Nigerian population that was already piling up. However, engineers came in more innovatively to develop facilities that would help in taking care of the high numbers of patients that were witnessed during the pandemic (Crick, et.al, 2020). However, these innovations and engineering works will carry on even beyond the pandemic era and help in the country's preparedness in case of another pandemic.

Innovation Hubs in Nigeria

The covid-19 pandemic demanded creative innovation in various sectors around Nigeria. Innovation Hubs in Lagos, Abuja, and Port Harcourt were all involved in tailoring ideas that would help solve the different problems that came along with Covid-19 in Nigeria. Many of these innovations are set to help the country deal with many

other problems across the nation and any future arising problems. The innovations are set to build more sustainable development across the country, ranging from the transport sector, health, education, and many other sectors (Crick, Knight, Watermeyer, & Goodall 2020). The innovation hubs across the country are set to allow young people especially those in universities across the country to develop creative ways to solve the various sectoral problems in the country. For instance, the high cost of ventilators used by patients in critical conditions, led Usman Dalhatu to coming up with an automated ventilator that would go a long way in helping patients in Nigeria with breathing in the case of critical infection.

Solutions to Food Insecurity in Nigeria

The agricultural sector, for instance, needs to have more and better and sustainable ways to ensure food security across the country (Kumar, et.al, 2020). Nigeria being one of the most populated countries in Africa, the poverty levels are also very high. With the high population and increased poverty levels, food insecurity in the country is inevitable. The pandemic, which demanded that everyone remain in their homes to reduce the spread of the virus, meant unlike before, it was hard for people around the

country to go out and work themselves out for a living. People living in urban areas like Abuja and Lagos were more affected by this move. However, despite the majority of the people in Nigeria living in urban areas, creative ideas of food production will ensure there is food security in the case of a similar situation in the future (Crick, Knight, et.al, 2020). Many of these innovative ideas, some of which came up during the pandemic and many others that will come from the innovation hubs, will help fight hunger across the country and nutritional-related problems.

ICT in Industries

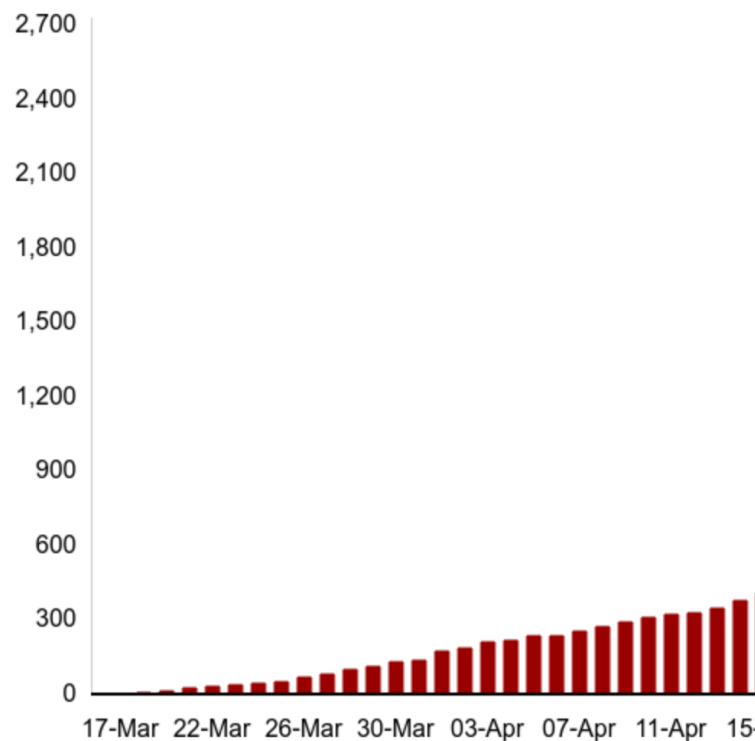
Technology is a major aspect of many industries across Nigeria. The success of leading industries in the country is majorly determined by how well they can embrace new technology and incorporate it into their operations. The optimal productivity of various industries and companies across Nigeria is dependent on their level of technology (Kumar, et.al, 2020). Most industries and especially manufacturing industries can only be sustained by keeping up with the new technological trends (Kumar, et.al, 2020). The pandemic introduced to industries a wide range of products to produce in large numbers. Unlike

before, the use of ventilators in most Nigerian healthcare facilities was minimal and could only be used in serious cases that needed intensive care. With the pandemic, many patients across the country found themselves in a space where they depended on ventilators for breathing due to breathing difficulties. The products were also quite expensive to import, which meant that industries had to develop ways to have mass production of ventilators (Crick, et.al, 2020). The use of masks and other protective gear was also needed in huge numbers for healthcare workers. Unlike before, their use was limited to serious cases of communicable diseases. However, due to enough supply and production of the protective gear, every health worker in Nigeria going forward will have enough for use during their daily operations in the various healthcare facilities in the country.

Combating Covid-19 with Research in Nigeria

With the entry of Covid-19 in Nigeria, advanced research to understand the disease and its spread was highly needed. Researchers across the country came up with more ways to do advanced research and better ways to handle the pandemic (Lorente et.al, 2020). Unlike the season before the pandemic, researchers in Nigeria took

more time to study the trends of various diseases and how to tackle them (Lorente, et.al, 2020). The technology was highly used to help determine the spread of the disease, the whereabouts of their various contacts around the country, and other important information needed to help deal with the pandemic. Unlike before, it is easier to follow up on patients on their whereabouts and how they are faring on after treatment (Crick, et.al, 2020). Medication to help suppress various diseases was also introduced courtesy of research organisations in Nigeria. The various medical research institutions led by the Nigerian Institute of Medical Research began the journey of coming up with a vaccine that would help stop the spread of the virus and which has been found, tested, and approved. Some of these research results that came from the pandemic will go a long way into the future in helping probably to deal with a similar pandemic or even other diseases.



Source: (NCDC 2020)

Advanced research is the future of Nigeria, and the country has taken that route to help solve most of its problems. It is only through research that we can get solutions to poverty, food insecurity, technology, health problems, and so much on, some of which have become a problem to the world for over a millennium (Lorente, et.al, 2020). The pandemic, ushered in a wide range of research activity across various sectors in the country. It has brought in quite a number of ideas that will be embraced within the various sectors in Nigeria even past the pandemic (Eric 2020). It is through research that the country through the ICT systems put in place that the

Fig 2: A graph showing the number of Covid-19 cases in Nigeria in 2020

country has embraced technology like never before. It is through research that medical solutions that were not there for certain diseases were discovered. At the moment, Nigeria's health facilities, through research, have been able to eliminate certain long-term diseases. Research centres developed across Nigeria will help in a great way to deal with any future problems right from the onset and provide serious solutions to current ones (Eric 2020). Due to the damage caused by the pandemic across the country, the Nigerian government has highly invested in research that they hope will keep them in a safe place in the future.

Technology as a solution.

According to research done within Nigeria, technology in the next few years will be the one thing that will run major sectors of the economy in the country. In recent years, technology has been used to solve the country's major problems, including the pandemic that we found ourselves in. Almost all sectors in the country had to embrace technology to survive the harshness of the pandemic (Eric 2020). Since the start of covid-19 in Nigeria, most economies were held by the roles played by technology (Eric 2020). The money market, education, health,

transport, imports, exports, etc., technology played a great role in ensuring that the government and the various sectors of the economy did not fail (Lorente, et.al, 2020). Part of the Covid-19 regulations demanded that no physical contact should happen between individuals, which acted as one of the measures that would ensure the virus does not spread further.

In the wake of strict regulations such as non-contact, closure of economies, and various sectors, technology came in to make sure that business and sectorial economies in the country did not fail despite all these regulations. Physical trade between Nigeria and other countries, which was a major boost for Nigeria's economy, came to a halt because of the various restrictions that the government put in place to avoid citizens from different countries, especially those that were highly affected by the pandemic, from accessing Nigeria (Eric 2020). In return, the government had to look for alternative ways and means to still do business with their counterparts from different parts of the world and maintain close ties before the pandemic. As hard as these seemed to be, technology came in handy and played a big role in ensuring that Nigeria still met their trade targets throughout the period of the pandemic.

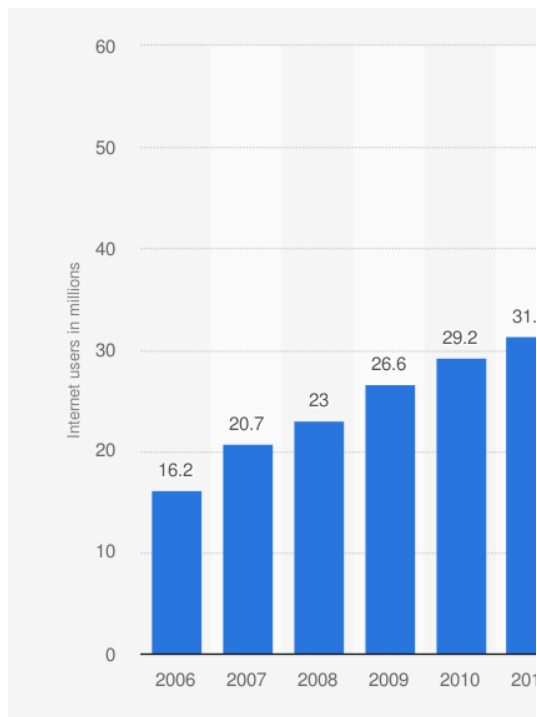
Through technology, individuals in business, despite the lockdown in various countries, could access goods and engage in business without their physical presence. Through the various innovative ideas that came up during the covid-19 era within the country, business people do not have to travel all the way to access their goods (Eric 2020). Rather, goods can now be delivered right at their doorstep, and all they needed is access to the internet and a platform from which they can access those goods. During the start of the closure of various countries, various citizens were held in foreign countries due to lockdown. Many Nigerians were either out for medical reasons, business activity, work-related reasons, or seeking an education (Eric 2020). However, through the various technological innovations that have been put in place over the covid-19 season, foreigners can easily access different services right at their homes' comfort. Many of these technological inventions will go a long way to the future to link major economies to their benefit. These innovations will also go a long way in supporting the economy's various sectors, especially in Nigeria.

Impacts of Technology on the Education Sector in Nigeria

The education sector in Nigeria, has been one of the hardest hits by the pandemic, yet the largest beneficially. The pandemic's quick spread meant the closure of all schools in the country due to the high numbers of pupils and students, and that gave a leeway for the disease to spread easily (Sheth 2020). Schools around the country through directives from the Federal Ministry of Education had to be subjected to a quick closure to avoid the disease's further spread to the students and pupils (Eric 2020). However, education stakeholders had to develop ways that would help keep education up to and running by keeping learners engaged even while at home with robotic tools and AI aided instructional materials (Ogbonnia, 2017). The safest place to run was to embrace technology (Sheth 2020). In most learning institutions, instructors had not embraced technology as an alternative way of delivering knowledge to their learners. However, in the wake of the pandemic, most instructors were forced to embrace digital learning, through the use of zoom and google meet, learning from home. Learners were taught, and exams were administered right in the middle of a lockdown without attending physical classes (Sheth 2020). Going into the future, the education system in

Nigeria will have to adopt the online way of engaging students in learning.

Fig 3: A graph of Daily Internet Usage in Nigeria



Source: (Baldwin, Weder & Mauro 2020)

Looking at the data given, the use of the internet in Nigeria has increased rapidly over the years, with 2019 and 2020 being the years with the highest number of users. Most of these developments, especially in the education sector,

are sustainable developments that will be carried on for several years as technology advances with time (Eric 2020). With the kind of technology that has been developed and adopted in the near future, students and instructors in the country will not have to attend physical classes (Ting, et.al, 2020). Physical buildings in the name of learning institutions may also, at some point, be considered useless, and instead, people will embrace the technological way of advancing their education and careers (Eric 2020). Before the pandemic got its way to Nigeria, some of the technological advancements we have at the moment were almost imaginable. Still, now that circumstance pushed the world to where we are, different sectors had to embrace the changes. The best thing about most of these changes is that they will take effect for a long time, meaning they are sustainable and will help in growing the country's economy to one of the best in Africa.

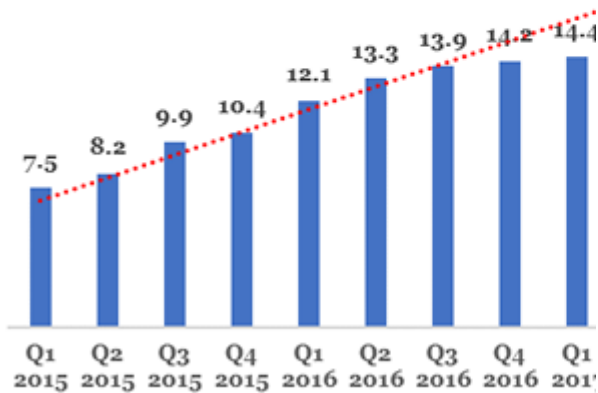
The Covid-19 season also has, in a significant way, shaped the direction of learning, especially in higher learning institutions in Nigeria. It has introduced a solution-based kind of approach to education (Ting, et.al, 2020). Impacting knowledge on learners has changed to triggering their minds to provide solutions to the various

problems facing the world. A more research-based and practical approach to learning has also been introduced in institutions of higher learning within the country. The pandemic has taught the world that the normal can go and a new normal adopted (Eric 2020). However, all these require a solution-based approach to all our problems across the nation. Part of why the spread of covid-19 was managed is that various people, including researchers, stepped up to look and provide solutions to the end of the pandemic (Whitelaw, et.al, 2020). Most of these changes that came up as a result of the pandemic will go a long way into the future, and there is a huge probability that in the future, education curriculums within the Federal Ministry of Education in Nigeria will be highly focused on providing to the various problems that we have around the country.

Part of the greatest effects of the pandemic was massive job loss in the country. Nigeria's unemployment rate rose significantly being the highest level ever reached since 2016. Job loss led various unemployed individuals to look out for different ways to earn a living (Whitelaw, et.al, 2020). Most of these people turned into entrepreneurship as a way to meet their daily expenses. Covid-19 came in as an eye-opener that people can create their own jobs

rather than depend on employment. It encouraged the narrative about creating employment rather than depending on employment (Whitelaw, et.al, 2020). Looking at statistics of the pre-corona period and those of the post-corona period, despite massive job loss and closure of business across the country, many businesses were also put to leverage the effects of the pandemic. Most of these businesses will go a long way into the future in raising the country's economy by contributing to the national Gross Domestic Product and tackling unemployment across the country.

Fig 4: Unemployment Rate in Nigeria



Source: (Arshad 2020)

Job loss due to the pandemic has also helped employed individuals realize that one can put up their own business without needing so much capital. This spirit will go a long way into the future to encourage young people in learning institutions across the country that they do not have to depend wholly on employment; rather, they have an opportunity to create employment and earn a living from their own businesses (Ferreira 2019). The pandemic experiences will also go a long way in helping already established businesses in laying a solid ground for the future (Ferreira 2019). The extent to which huge businesses were shaken and some hit to the ground led major businesses to rethink their way of doing business

operations to avoid future frustrations. As part of the business operations in Nigeria, businesses will have to invest in technology and even investing part of their proceeds as security for their businesses.

Technology played a key role in the fight against Covid-19; as a matter of fact, ICT played a major role in ensuring that the virus's spread was minimized to manageable levels in the country. Part of the reasons why ICT was a major boost in making sure the virus was suppressed in the country, is that the Covid-19 response demanded that important information about the disease reached every individual worldwide since it was a global pandemic (Whitelaw, et.al, 2020). It also required that every person worldwide is well educated and informed about Covid-19, its symptoms, effects, and how to avoid contamination. Most of this information needed high-level technology to reach every individual across the nation.

The World Health Organization had set out different regulations to help curb the spread of the disease. Most of that information would only go around the world through the intervention of high-level technology (Whitelaw, et.al, 2020). It was also important for data on the number of infections and deaths and the intervention level by various stakeholders to reach every individual

across Nigeria. This was made possible through ICT, which acted as a major boost, especially in keeping the people informed (Whitelaw, et.al, 2020). This high-level technology will also be used going forward to help with relaying information about the state of health across the country and setting out the various measures in which diseases can be dealt with (Ali 2020). One of the major operations of dealing with any disaster is making sure that everyone is well informed about the progress and, more importantly, to keep every individual on notice of what is expected of them to do to help bring down the effects of the disaster. It is with no doubt that going into the future; technology will play a huge role in shaping the economy and different sectors in Nigeria

A lot of development happened during the covid-19 season because different sectors had to mitigate the risks that came up with the pandemic. The transport sector in Nigeria for instance which was one of the sectors which was affected in a big way, had to look for ways to meet daily demands. Air travels from the country was restricted and it was impossible for people to travel around for whatever reason (Ali 2020). Airports around the country were rendered inactive and only cargo planes were active. There was also massive retrenchment

across several airlines which they did so as to reduce the high cost of running airlines (Arshad 2020). However, in the reduction of the spread of the pandemic and the positivity rate, airlines and airports were subjected to new set of rules from the Federal Ministry of Aviation that would ensure safety across all airports and that would allow only healthy people to travel (Arshad 2020). Airports around the country were subjected to a new set of regulations and development that going forward would allow anyone travelling from Nigeria to undergo a serious scrutiny before they are allowed to travel (Bunker 2020). Before the pandemic, individuals travelling to different countries were not necessarily required to go through a health check-up but as is the case now, every individual has to present medical results that prove they are not in any way infected with the virus or any disease that would easily be spread.

Besides having to go through a number of health check-ups, airports in the country had to organise themselves in a way that would not allow for the spread of the virus. Many developments had to be done to accommodate the new normal (Bunker 2020). Some of the regulations that were put in place by the world health organisation such as avoiding physical touch among individuals and

maintaining social distance, has to be strictly adhered to, to curb the spread of the disease across Nigeria. Airports had to make serious adjustments to accommodate some of these developments that came along with the pandemic (Dwivedi et al. 2020). One of the best ways to meet most of the regulations that were given was embracing technology. Technology including the use of artificial intelligence in testing for the virus or any disease that could easily be spread from person to person. Most airlines and airports in the country had to establish areas that would be used as quarantine facilities and treatment areas for any suspected positive cases (Dwivedi et al. 2020). Airports also had to come up with a security system that made sure there was no contact between individuals. That way, they had to introduce a security system that was technologically advanced that did not require any contact between persons (Ferreira 2019). Looking at the pre-covid-19 season and the post-covid-19 season in the country, many developments in these areas of travel have happened and most of these developments will go a long way in to the future to ensure effectiveness in air travel in the nation.

The fact that Nigerian travel regulations demand passengers get tested and proved healthy before being

allowed to travel and the use of technology in carrying out operations around airports are also great developments that will significantly help the air travel sector develop in a significant way (Ferreira 2019). The collection of passenger data before they embark on any mode of transport within Nigeria is also another vital move that came with the pandemic. In as much as the regulation for collection of passenger data was introduced for easier contact tracing, it will also go a long way in ensuring security in all means of transport (Hodder 2020). Initially, criminals would take advantage of using transport and carrying out criminal activity without getting noticed and go away with it (Hodder 2020). However, with the recent development where travellers are required to surrender all their information and personal details before boarding, criminal activities will reduce drastically.

Covid-19 season was an extra-ordinarily season for the country. It was a season to embrace the new normal. Most of the things and trends that happened initially, were reduced to a new system of doing things (Hodder 2020). Most sectors in the country had to embrace a new system of running their activities since most activities initially in a way that would highly lead to the spread of the virus and that was an impending danger (Hodder 2020). Major

developments in Nigeria have happened during the covid-19 season and these developments have seen many sectors improve on their way of doing things. ICT has been embraced massively because it is one of the ways that advocates for contactless operations between individuals across different sectors (Zaman, et.al, 2020). However, the most interesting thing about the pandemic is the fact that most of these developments and innovations are well sustainable into the future. It is important to note that sectors that have embraced technology will in a major way be productive than before, hence growing the economy in a significant way (Zaman, et.al, 2020). Embracing these developments will go a long way in helping the country in meeting financial goals and ease operation across different sectors.

Conclusion

During the Covid-19 pandemic and sit at home lockdown, technology became the way out for a lot of businesses and organizations. People went into online business and crypto trading. So many unemployed people started online business, therefore taking technology away from people now will be drastic because a lot of people are now accustomed to the way of technology. It has become a

part of our lives and will bring a lot of disaster if technology is taken away instead of being improved. In order to hold such portion of ICT sector in the future, continuous supply of relevant qualified ICT professionals into all sectors are required

In conclusion, technology has done more good than harm therefore should be incorporated into a lot of things we do for the betterment of tomorrow.

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