A TECHNICAL REPORT

ON

ENGINEERING STRATEGIES FOR HANDLING COVID-19 FOR ENVIRONMENTAL HEALTH AND ECONOMIC SUSTAINABILITY

PREPARED BY

BRIGGS FRANCIS SOIBI

17/ENG 04/015

SUBMITTED TO

ELECTRICAL/ ELECTRONICS ENGINEERING DEPARTMENT,

COLLEGE OF ENGINEERING,

AFE BABALOLA UNIVERSITY, ADO-EKITI,

EKITI STATE, NIGERIA.

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF ENGINEERING (B. ENG.) DEGREE
IN ELECTRICAL/ ELECTRONICS ENGINEERING

MARCH-APRIL 2020

CERTIFICATION

This is to certify that this report was written by **BRIGGS FRANCIS SOIBI** with matriculation number **17/ENG04/015** in the department of **Electrical/Electronics Engineering**, College of Engineering, Afe Babalola University Ado-Ekiti (ABUAD) during the 2019/2020 academic session, on **Engineering Strategies For Handling COVID-19 for Environmental Health and Economic sustainability**

ABSTRACT

COVID-19 , otherwise termed the **Corona Virus** originated from China in a town known as Wuhan. It first broke out in 2019 but quickly spread nationwide and worldwide by 2020. As such the world is in a state of panic due to stocks crashing because there is no trade going on over this period of time. This report is going to elaborate on the techniques engineers can indulge in to keep the virus from spreading and the economy from crashing.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

The Covid-19 pandemic has been ongoing for the past 6-7 months, due to how easily it spreads the WHO has instructed people to observe self-isolation. This though an effective strategy will take the world aback from its estimated earnings and projects.

To prevent this virus from infecting people and how to tackle the issue, one must first know and understand what the virus is.

What is COVID-19 (The Corona Virus)

According to Wikipedia: Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was first identified in December 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, resulting in the ongoing 2019–20 coronavirus pandemic. Common symptoms include fever, cough and shortness of breath. Other symptoms may include fatigue, muscle pain, diarrhoea, sore throat, loss of smell and abdominal pain. The time from exposure to onset of symptoms is typically around five days, but may range from two to 14 days. While the majority of cases result in mild symptoms, some progress to viral pneumonia and multi-organ failure. As of 10 April 2020, more than 1.6 million cases have been reported in more than 200 countries and territories, resulting in more than 95,800 deaths. More than 356,000 people have recovered.

Transmission

The virus is mainly spread between people during close contact, often via small droplets produced during coughing, sneezing, or talking. While these droplets are produced when breathing out, they usually fall to the ground or surfaces rather than being infectious over large distances. People may also become infected by touching a contaminated surface and then their face. The virus can survive on surfaces for up to 72 hours. Coronavirus is most contagious during the first three days after onset of symptoms, although spread may be possible before symptoms appear and in later stages of the disease.

Prevention

Recommended measures to prevent infection include frequent

- hand washing,
- maintaining physical distance from others (especially from those with symptoms),
- Covering coughs and sneezes with a tissue or inner elbow and keeping unwashed hands away from the face.
- The use of masks is recommended for those who suspect they have the virus and their caregivers.

Recommendations for mask use by the general public vary, with some authorities recommending against their use, some recommending their use and others requiring their use. Currently, there is no vaccine or specific antiviral treatment for COVID-19. Management involves treatment of symptoms, supportive care, isolation and experimental measures.

Now that we understand what the virus is and how it spreads let us talk about the global ramifications and complications of the virus on society and life as we know it. This study will be taken particularly from a socio-economic standpoint.

The stock markets are at an all-time low and the economy is crashing. This is because by the fact major manufacturing industries in all fields are either taking a pause or completely stopping due to the lack of man power cause by the self-isolation. Engineering giants like Telsa and game consoles makers like Nintendo are amongst those announcing delays in shipments as at 7th April 2020 due to the virus outbreak. Airbus and Hyundai are among those who have totally paused production. As a result a lot of money is being lost and it will take a while to

salvage the money lost.

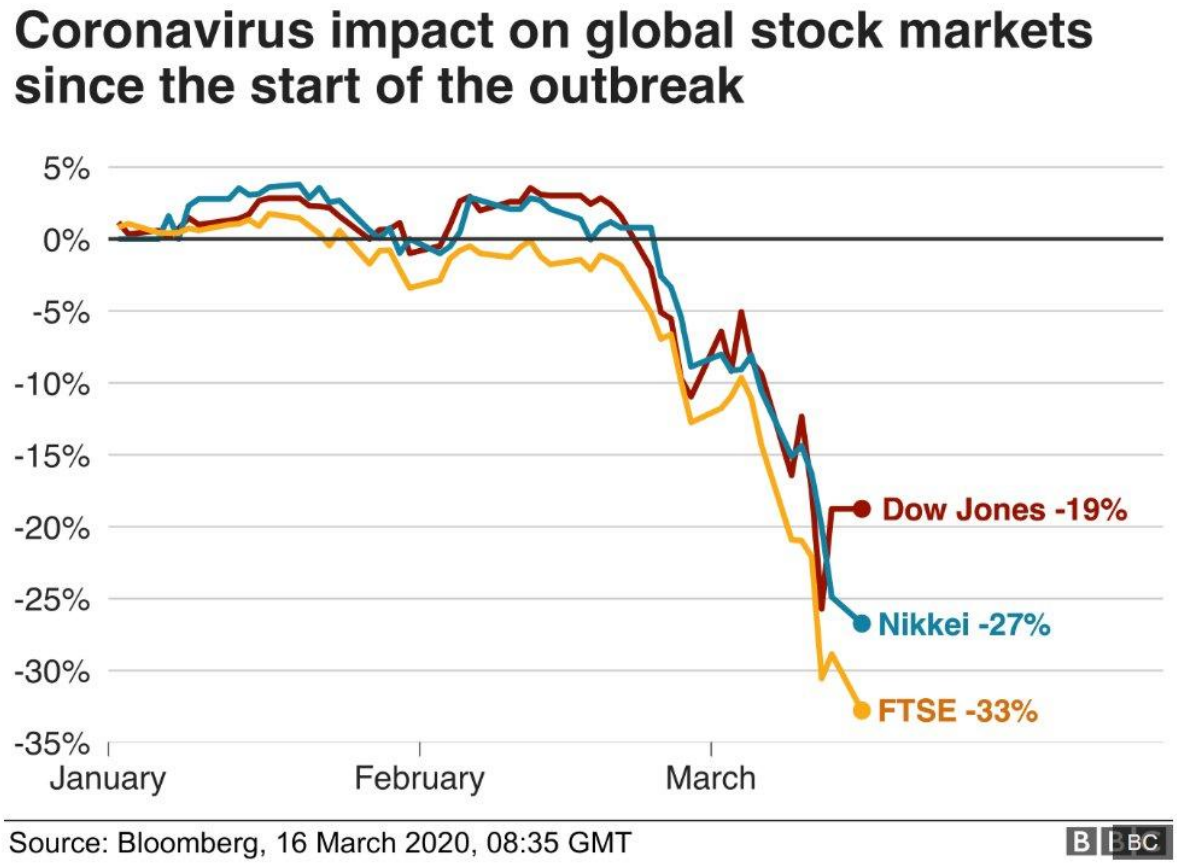

Fig1

Here is chart showing the effects of COVID19 on stock markets over a three month time period. It is showing a phenomenal decline the value of goods over this period cause of the lack of consumption of the goods being proceed. Such that the numbers are in the negative percentile.

The consequences of this are as follows :

- Unemployment rates have increased
- Bankruptcy
- Debt

UNEMPLOYMENT

Unemployment a state of being when a person who is actively searching for employment is unable to find work. Unemployment is often used as a measure of the health of the economy. The most frequent measure of unemployment is the unemployment rate, which

is the number of unemployed people divided by the number of people in the labour force. This could be on a number of reasons though this report is on the COVID19 pandemic. The figure below is a study taken in America to show the effect the virus has had on the employed citizens.

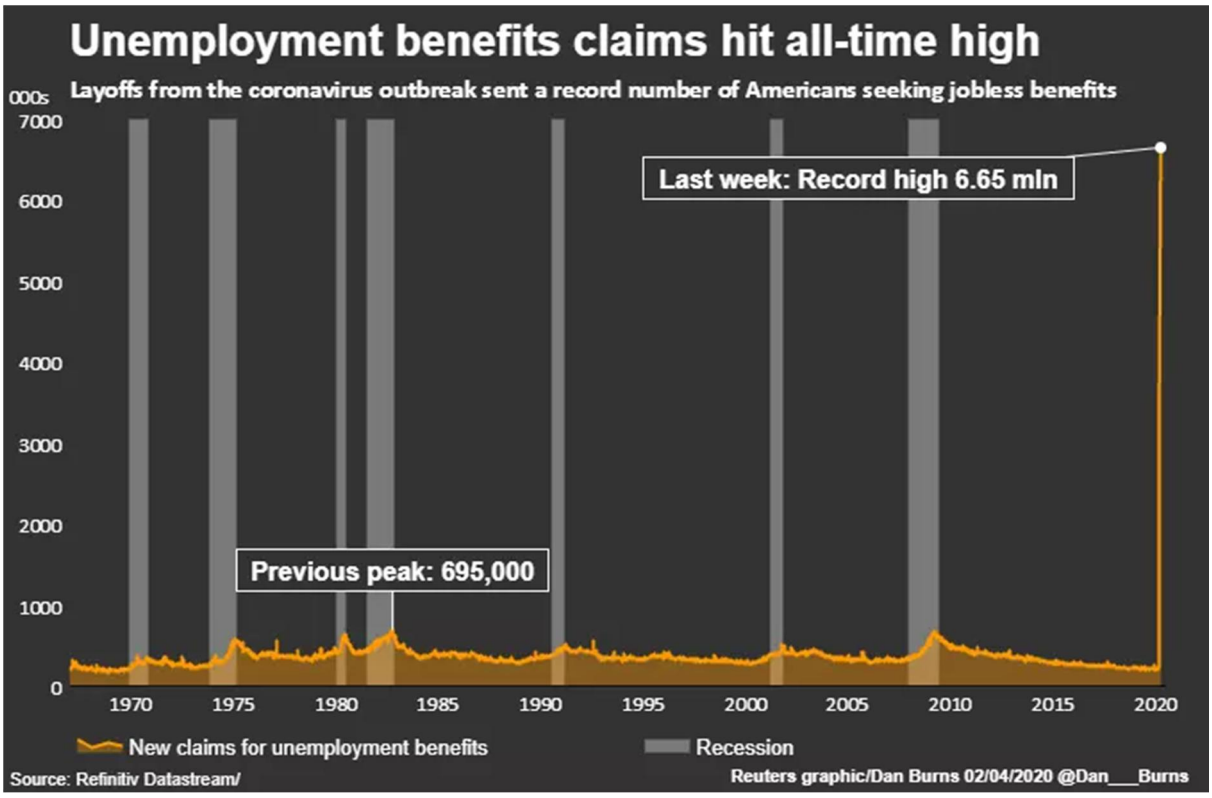

Fig2

As it can be seen this is the highest record of unemployment benefits over the last 4 to 5 decades.

BANKRUPTCY:

Bankruptcy is the legal proceeding involving a person or business that is unable to repay outstanding debts. The bankruptcy process begins with a petition filed by the debtor, which is most common, or on behalf of creditors, which is less common. All of the debtor's assets are measured and evaluated, and the assets may be used to repay a portion of outstanding debt. This is getting more and more likely especially for small business on the stock market with shares and stocks dropping as low as 12%. Oxford Economics warned that the spread of the

virus to regions outside Asia would knock 1.3% off global growth this year, the equivalent of $1.1tn in lost income.

The consultancy said its model of the global economy showed the virus was already having a "chilling effect" as factory closures in China spilled over to neighbouring countries and major companies struggled to source components and finished goods from the east of the globe.

Oxford Economics said it expected China's GDP growth to fall from 6% last year to 5.4% in 2020 following the spread of the virus so far. But if it spreads more widely in Asia, world GDP would fall by $400bn in 2020, or 0.5%.

If the virus spreads beyond Asia and becomes a global pandemic, world GDP would drop $1.1tn, or 1.3% compared to the current projection. A $1.1tn decline would be the same as losing the entire annual output of Indonesia, the world's 16th largest economy.

DEBT

Debt is an amount of money borrowed by one party from another. Debt is used by many corporations and individuals as a method of making large purchases that they could not afford under normal circumstances. A debt arrangement gives the borrowing party permission to borrow money under the condition that it is to be paid back at a later date, usually with interest.

Top countries in debt since COVID19

1. JAPAN (National Debt: ¥1,028 trillion ($9.087 trillion USD))
2. GREECE(National Debt: €332.6 billion ($379 billion US))
3. PORTUGAL(National Debt: €232 billion ($264 billion US))
4. ITALY(National Debt: €2.17 trillion ($2.48 trillion US))
5. BHUTAN(National Debt: $2.33 billion (USD))
6. CYPRUS (National Debt: €18.95 billion ($21.64 billion USD))
7. BELGIUM (National Debt: €399.5 billion ($456.18 billion USD))
8. USA (National Debt: $19.23 trillion (USD))

9. SPAIN (National Debt: €1.09 trillion ($1.24 USD))
10. SINGAPORE(National Debt: $350 billion ($254 billion US))

Japan, with its population of 127,185,332, has the highest national debt in the world at 234.18% of its GDP, followed by Greece at 181.78%. Japan's national debt currently sits at ¥1,028 trillion ($9.087 trillion USD). After the stock market crashed in Japan, the government bailed out banks and insurance companies and provided them with low-interest credit. Banking institutions had to be consolidated and nationalized after a period of time and other fiscal stimulus initiatives were used to help reboot the struggling economy. Unfortunately, these actions caused Japan's debt level to skyrocket.

China's national debt is currently 54.44% of its GDP, a significant increase from 2014 when the national debt was at 41.54% of China's GDP. China's national debt is currently over ¥38 trillion (over $5 trillion USD). An International Monetary Fund report from 2015 stated that China's debt is relatively low, and many economists have dismissed worries over the size of the debt both in its overall size and relative to China's GDP. China currently has the world's largest economy and the largest population of 1,415,045,928 people.

All these are negative impacts of the corona virus on the modern day society. The impact of all these are grave and can will change the face of the world going forward. As engineers we are professionally expected to solve problems when the need arises. And as such engineers have to contribute whatever tools at their disposal to fighting this pandemic.

CHAPTER 2

FIGHTING THE PANDEMIC

These are some ideas engineers can do to tackle the ongoing COVID 19 pandemic:

- Making readily available the equipment to fight the virus
- Stay at home
- Improved Communication means.
- Practice social distancing

EQUIPMENT AVALIABILTY

The corona virus pandemic is spreading like wild fire and the equipment held by hospitals in countries infected would prove to be insufficient in the long run. This is a result of how quickly the virus spreads and how long the incubation period is. Another big issue is even though the virus is in incubation it can still be spread as earlier discussed. As such the equipment needed to tackle such a virus would be in shortage. Bio-technological and pharmaceutical giants like:

- Johnson & Johnson
- Roche
- Novartis
- Merck and Co.

Should utilise their current status and situations to press for more engineers to be made readily available (while still observing the stated prevention measures in page 4&5 so as not to further the virus). Engineers from different fields should all band under a pharmaceutical giants to meet their needs in order to meet the needs of those infected and speed up the process of finding a cure.

Finally, in bioengineering could also provide emergency infrastructure to help both contain the epidemic and treat those affected. The speciality 1,000-bed field hospital built in just 10 days in Wuhan was a feat of engineering willpower, and a case study for rapidly delivered infrastructure.

As well as prefabricated units, the can pharmaceutical companies incorporate specialised ventilation systems and quarantine wards, which offer useful lessons for other regions coping with an outbreak of infectious disease, as well as other humanitarian situations.

Meanwhile, the use of robots to deliver medicines and food to quarantined patients can help reduce the risk of infection among medical staff, and limit the spread of disease, while also ensuring that patients' needs are met.

STAY AT HOME

Staying at home and self-isolation has been the most reoccurring message out in the internet. This preventive measure should be taken by all professions. As such its necessary you buy and store the essentials you need for survival and escape for the boredom.

These essentials are in three basic categories:

- Work from home essentials
- Food essentials
- Entertainment essentials

WORK FROM HOME ESSENTAILS

Ideally everything you need to work from home efficiently, from video conferencing services are listed below:

- Desktops or laptop to work with
- All your office files updated on your system
- Make sure your home Wi-Fi is up to speed
- Skype and other video conferencing services

FOOD ESSENTAILS

- Make-ahead freezer meals to cook now and eat later

- Get food delivered to your door and sanitize it before entering the household
- Invest in power inverter so that food storage would be easier with refrigerators

ENTERTAINMENT ESSENTIALS

- Read books online
- Buy online games so you can play in spare time
- Rent new movies on Netflix or other streaming services

  Important note:

  Just because gyms are closed doesn't mean you shouldn't say physically active. You can star working out from your house, whether you have any exercise equipment or not. This will aid health and body movement. Some stay at home exercises are:
- Squats
- Pull ups
- Push ups
- Lunges.

COMMUNICATION

Communication is the greatest tool the engineering society as a whole can contribute to fight against the corona virus pandemic. With the rapid spread of COVID-19, providers including nurses, physicians, and allied health professionals are working around the clock to ensure the safety and treatment of their patients. Unfortunately, many of these patients require intubation or other escalated respiratory support, resulting in an inability to speak. Hospitals and healthcare workers across the country need resources and strategies to support communication in alternative ways.

Communication is also necessary to keep the population updated on the crisis and situation in their immediate environment. Good and effective communication will give civilians what to do and what no to do. The areas of the countries that are most affected and the places that are moderately safe to go to.

Communication will also help big industries and education institutes to at least get their administrative jobs together and updated. This helps in a number of ways. They are listed below

- It ensures the company doesn't go broke; this reduces bankruptcy rate and ensures job security of non-administrative staff who are out of the job for the time being.
- It ensures education programmes can continue with applications like skype so the education system is not held aback.
- Provides enlightenment to the populace of the do's and don'ts.

Communication giants such as Facebook, WhatsApp, skype etc. should make it easier for government to connect with their public so as to create more exposure.

CONCLUSIONS

In conclusion, the corona virus pandemic is a big problem and so the precautions stated in the previous chapters. These precautions must be taken to into consideration to ensure stability economically .