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ENGINEERING RESEARCH AND INNOVATIONS; OUR SOURCE OF ECONOMIC SECURITY IN POST COVID-19 PANDEMIC ERA

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ABSTRACT : *Engineering research is a key to human, national and global development. In the course of man to solve problems which engineering seeks, inventions and innovations comes up especially security wise economically. It is noteworthy to know that research, engineering and innovations, have roles to play in economic security. It is envisaged that research help engineering outfits have knowledge about existing economic security platforms. There are bound to be economic security outputs with inventions and innovations. Engineering will give back-bone to economic security given our present precarious times. Economic security achieved through innovations is explained. It can be understood that research, engineering and innovations have their roles of enhancing the external sector output and exchange. This topic should be a major area of concern in recognition of the important role research plays in economic security. Governments handling Federal, States and Local parastatals are playing a role of advancing engineering and innovations through research. Those in these parastatals should play basic functions like instructions, research, inventions, innovations and community or extension services. These aspects should be at the front burners as to ensure economic security. The thrust of this paper is to examine the role of engineering research and innovations in guarantying our security in post COVID-19. It was shown in the paper that after the total lockdowns of economic activities, the world almost faced recession. The fight to get back to normalcy as the economy gradually resumes economic activities faced serious hitches. The roles of engineering research and innovations, the importance of research, conclusions and recommendations were understudied. Policies bordering on researches, innovations, inventions, engineering, economic diversifications should be enacted and promulgated extensively which are all geared towards economic security in the post covid-19 pandemic era.*

KEYWORDS: *Engineering, Research, Innovations, Security, COVID-19 era.*

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I. INTRODUCTION

Economic security is the process by which the productive capacity of an economy is protected against attack, danger or extinction over a given period, causing increase in national income. Research is a systematic investigation designed or developed to create awareness and contribute to the volume of the existing knowledge. Research in the field of engineering is essential, since engineering and innovations are the driving tools for economic security. Widely speaking, engineering is the "art or science of employing and utilizing the materials and forces of nature for the benefit of mankind and of organizing and directing human activities in their use"

(Igbeka, 2002). Creating awareness in this field will make an individual to become responsible enough to human problem and solutions with regards to economic security. If engineering research and innovations are developed and explored, we will be secured economically especially in this post COVID-19 pandemic era. Economic insecurity was seen as insurmountable but research and innovations gave us the needed leverages. Today, the wealthy world (government, political class) spends around a third of its income on covid-19 solutions for sustainable economic security in this post covid-19 pandemic era. According to Ferrer et al., (2012), there are many reasons for not being able to tap the faculty members in advancing knowledge through research. In the covid-19 era, engineering research and innovations encouraged her academic professionals to engage and improve themselves along the areas of research and extensions.

Engineering derived through research are profitable outputs which have global significance. Research productivity off-shoots a society's economic security and other aspects. The last time the world was hit by a pandemic was between 1918 and 1920. In that case, it was the so-called "Spanish flu" that killed over 50million people and infested 500 million people out of a global population of about 2 billion individuals. The death rate of the Spanish flu was even worse than that of the "Black plague" of the fourteenth century. The world was not globalized and western societies did not benefit from today's public services and levels of well-being and wealth. The global population communicated mainly with letters and by the postal services. There was no mass media but newspapers and magazines being the main sources of information (Mehand et al., 2018).

A century later, the world is once again confronted with a new pandemic phenomenon, the one caused by the spread of the COVID-19 virus. First identified in Wuhan, China in December 2019, the virus soon spread around the world, reaching its fourth wave before the decline of the spread of the virus. In total, from 2019 to date, the infected have been 163 million and the dead over 3 million. Some exogenous factors that have helped the spread of the virus are:

The initial under estimation of the risk of contagion outside China.
The speed and globality in the movement of goals and people.
The initial unpreparedness of national health systems for very high numbers of infected people.

The global resilience capacity has been entrusted, unlike the beginning of the last century, to the formidable global industrial scientific and pharmacological machine, capable of productive personal protective equipment and vaccines in record time. The outbreak of the pandemic had first and foremost medical and health impacts, secondly, economic, security, social and psychological impacts. The measures adopted by individual government to stem the contagion lockdowns, travel limitations etc have had direct consequences on the world job market, on global economic productivity, on the growth and education of the younger generation and finally on the mental health of individuals (Jia and Min, 2020). Since the dawn of the pandemic era, a third of the global population has been put in quarantine and has impacted billions of lives around the world. Engineering research and innovations from 5 continents tackle a range of challenges, from making health care and emergency services more accessible, to increasing the inclusivity of the labour market and economic security landing systems in the post covid-19 pandemic era. Rapid technological advancements are often triggered by external events such as international conflicts, political pressure, economic downturn, war, competitions or diseases (Zhena, 2020).

II. MATERIALS AND METHODS

The materials used in this study include literature sources from Journals, books, online sources etc. The methods include open-ended review of how engineering profession can impact the society using engineering information.

A. The Roles of Engineering Research and Innovations Understudy

The COVID-19 pandemic has triggered the drive for technological advancement. Scientists, engineers and innovators have risen to the challenge by doing what they can do best, which are designing, building and prototyping machines that will help and ensure the security and survivability of humans. Bio-medical engineering researches and innovations took the front seat in the helm of the different engineering researches and innovations that have not only ensured the security of humans in the pandemic era, but also gave us a fighting chance against the pandemic and post pandemic. Most of the innovations, research and design, put in place to ensure human and economic security was put forward by biomedical engineers, a few of them includes

robotics, drones, ventilators, face masks and diagnostic kits.

Robotics:

Robotic technologies have been utilized in many ways during the current pandemic.

a) Robots were designed to communicate between patients and doctors at a distance.
b) To disinfect surfaces with UV light.
c) To deliver essential medical supplies.
d) To monitor vital signs.
e) To remind people of infection prevention measures like social distancing.
f) To scale-up production of diagnostic tools, drugs and vaccines.

Drones:

Canada – based drone Tech-firm "Dragonfly" is rolling out stationary cameras and drones to detect people with covid-19 symptoms. Drone engineers and enthusiasts use drones to monitor social distancing measure in a large gathering and to deliver essential medical supplies to remote hospitals and clinics. Virus spotting drones were also used as early diagnostic tools by obtaining people's temperature and identifying the possible spread of infections through engineering research. Engineers equipped drones with speakers to remind people of quarantine protocols innovatively. Even though drones are not considered medical devices based on their intended use, their role as support tools should be recognized in our health care system.

Ventilators:

Covid-19 fatality rate is estimated to be 3% of the infected cases. The SARS-Cov-2 Virus causes respiratory diseases and affects cells in the nasal cavity, bronchia and lungs. In severe cases, the patient may experience significant difficulty in breathing requiring a ventilator incubated into the lungs to support breathing. Usually, intubated patients stay on the ventilator for days and even weeks. With the limited availability of ventilators in the health care systems, many patients cannot survive.

In North America and Europe, the need for the ventilators was publicly announced. In Canada, several local companies were awarded contracts by the government to produce 40,000 units in anticipation of the country's ventilator requirements. They include Thornhill Medical CAE Ventilators for Canadians and a group led by StarFish Medical to produce up to 30,000 ventilators (Zheng, 2020).

Face Masks (Body Protective Devices):

The shortage of masks for healthcare workers and increasing global interest in protective masks, innovative ideas have come to light. One high-tech mask is the "Guardian G-Volt" breathing mask. "It utilizes a laser-induced Graphene filter that works to trap and even repel viruses, bacteria and a range of other pollutants. It was a low-level charge that is delivered to the unit via USB and enables it to be 99% effective at blocking particles larger than 0.3 microns. Another innovative mask is designed for the dental industry. Dental health care providers are considered the most vulnerable medical sector for infection.

Myant, a Canadian company, announced that they developed a mask for dental professionals. Their mask includes a washable textile and textile-based respirators. We have a full-face Snorkeling mask with a filter attached.

Snorkel gear was repurposed as a mask to serve as protection against infection made by an Italian company, Mestel safety, part of the Ocean Reef Group. The use of face masks is here to stay until a covid-19 vaccine becomes available to public.

Covid-19 Diagnostic Kit at Point of Care:

Diagnostic tools are paramount in any Communicable infection scenario. The most important aspect is to detect who is and who is not infected as quickly as possible. For covid-19, it is difficult to detect the level of infection because of its unique way of infecting people. Innovations on diagnostic tools are on-going using different technologies such as new fluorogenic aptamers, nanotechnology, quantum dots, advanced image sensors,

electrochemical sensors, micro fluidics and other technologies. Below are some approved diagnostic tools for detecting covid-19 using proprietary molecular point-of-care test platforms. Most of these diagnostic tools include an essay designed to detect the virus, a micro fluidic cartridge and a reader, what a wonderful engineering research and innovations securing economic impactations (Zheng, 2020).

B. The Importance of Research

The concept of engineering research has relevance for all innovations and inventions to combat human problems and ensure economic security. Research is imbued with numerous significances to human society and they are;

To gather necessary information: Research avails one of all necessary information needed in the field of your work, study or operation before commencing on the job. It furnishes the society with the information required.

To make Changes (Innovations): Sometimes, there are in-built problems in a process or a project that is hard to discover. Research aids us in finding the root cause and associated elements of a process (solution). Research is an agent of change and brings change as well.

To improve standard of living and make life safer: It is mostly through research that inventions and innovations come into life. The amenities and luxuries enjoyed today are after effects of researches carried out by someone else like the electricity is invented by Thomas Edison of blessed memory. The existing world is facing numerous challenges, crisis, problems etc of man-made and non-man-made issues. We need engineers in research and innovations to impact for survival and security of mankind, so that our life expectancy can be improved. Research helps in eradicating or preventing these problems from re-occurring.

To increase the volume of knowledge and diversify them.

To know the truth (facts): Research is needed to investigate and expose occurrences and bring out impactful and sustainingly securing facts.

III. CONCLUSION AND RECOMMENDATIONS

A.CONCLUSION

Owing to its versatile characteristic effects, research has been seen as a vital tool in engineering and innovation for the needed economic security, being a life changer (impactations). Quality management of research is a critical factor in engineering and innovations. Although, it is far more difficult to achieve quality research programmes without heavy funds. And heavy funds are provided by governments (political class) for the well being of her citizenry and the world at large because problems and plaques know no boundary and continuity is assured.

B. RECOMMENDATIONS

Engineering researchers should as a matter of importance harkens to the clarion calls of near to perfection ways of living and put more efforts to conducting relevant contemporary research findings with a view to inform and educate the world for personal and societal impactations. The wellness of the society is highlighted through this paper by dwelling on the importance of research and the roles of engineering research and innovations.

Governments are the catalysts for engineering research and innovations. I recommend that the topic “Engineering Research and Innovations; Our Source of Economic Security in Post COVID-19 Pandemic Era” be committedly engaged.

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