A Comparative Analysis of the Effects of Robots on Nigeria Economy.

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Abstract: *There is a growing trend among academia and business leaders on the issue of 21st century automation revolution that is about to take over the labour market. There had been arguments and counter arguments on both the negative and positive impacts of this industrial revolution. The developed countries are worried over this development and have been trying to put all machineries in place in order to forestall the negative impacts in case it occurs. Unfortunately, the developing countries are not preparing for this revolution. The paper offers an economic analysis technique based upon the premise of increased probability of robotics capturing the labour market segments. The negative and the positive impacts of robotics on both individual and government were looked into. The inadequacy of current economic analysis techniques to assess the economic importance of robots was considered. It was adduced that this technological revolution will actually displace people of their jobs but new jobs will open in another form which are meant for those that had developed themselves in other areas that these human-like machines cannot do such as peace and conflicts resolution.*
Keywords: *Artificial Intelligence (AI), Expert System (ES), Sensors, Automation, Robots.*

I.   Introduction

The 21st century technological revolution is coming after the hill of mobile revolution of 20th century that will involve the use of Artificial Intelligence (AI), Expert System (ES), Sensors in developing robots.

A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks [7]. Robot could be manipulator, legged, wheeled, autonomous under water vehicle, unmanned aerial vehicle, etc. These robots are used for jobs that are dangerous for humans like cleaning the main circulating pump housing in the nuclear power plant (Decontaminating robot), repetitive jobs that are boring, stressful or labour intensive for humans (welding robot), menial tasks that human don't want to do (scrub mate robot).

Robotic manipulators used in manufacturing are examples of fixed robots that had been in existence over the years. They cannot move their base away from the work being done. Today, robots are mobile bases that have wheels or tracks attached. Some even employ legs in order to move which is the technology of Expert System (ES) in Artificial Intelligence (AI). [9]

Expert System (ES) is an Artificial Intelligence (AI) program that has expert-level knowledge about a particular domain and knows how to use its knowledge to respond properly. Domain refers to the area within which the task is being performed. Hence, Expert System as "an intelligent computer program uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solutions." [10]

Robot is a machine that is human-like and programmed to reason and respond more quickly than human counterpart using knowledge base and inference engine. As this intelligent machines begin their march on labour and become more sophisticated and specialized than first generation cousins that are fixed; then these machines will soon overhaul our economy. [5]

Statement Of The Problem

The 21st century technological innovation and advancement has received a lot of criticism from scholars and researchers because of the adverse effect on the economy. However, historically, innovations were sometimes banned due to concerns about their impact on employment as well as economy; but this has generally not been considered as a solution rather an overall benefit to the society. There was a call by Gandhian economist to delay the adoption of labour saving machines until unemployment was alleviated and this was heeded to in the 20th century in China under Mao's administration. [3, 8, 6]. The U.S president Donald Trump administration was called upon to urgently find a solution to the upcoming displaced workers since companies

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are busy building new plants that will lead to fewer people being employed, adding that "people aren't going to have jobs". [11]

OBJECTIVES
i. To determine whether or not technological innovation and advancement will cause unemployment.
ii. To find an alternative means of survival in the face of this 21st century technological revolution that is coming after the mobile revolution.

METHOD
Discussion will be used in this paper throughout which is employed in the analysis of both present and future robotic machine.

II. Literature Review

Oxford university researchers had estimated that 47% of US jobs could be automated within the next two decades. Even if ½ that number is closer to the mark, workers are in for a rude awakening. Though, it is believed that this may be the ultimate means of solving the wealth inequality dilemma. In their work, they find out that when mechanization took over in the 1800s in agricultural sector, 80% of the labour force that worked on the farm reduced to 2% and as a result they transitioned to jobs in other areas. Obviously, mechanization didn't destroy the economy but rather made it better off as food became cheaper compared to what it was relative to income and as a result, people have more money to spend on other things. They discovered that the 21st century industrial revolution is totally different as there isn't a new place for all these workers to move. [5]
A phenomenon called Peltzman Effect, based on research from an economist at the University of Chicago who studied auto accidents found that the introduction of safety features like seat belts into cars will even increase the rate of fatalities and injuries. The reason is that people will take advantage of this and take more risks. This is equally true of the economic arena as people having guarantee of their income will turn into slacker and destroy the economy. He concluded that moving into this industrial revolution might push people toward more entrepreneurship and more risk-taking. [5]

In 1964, a group of Nobel prize winners, known as Adhoc committee on the Triple Revolution, sent a memo to president Lyndon Johnson alerting him on the danger of a revolution triggered by "the combination of the computer and the automated self-regulating machine". This they said, was leading to a new era of production "which requires progressively less human labour" and threatened to divide the society into skilled elite and unskilled underclass. The advent of personal computers in 1980s also provoked further hand-wringing over potential job loses.

David Autor, an economist at the Massachusetts Institute of Technology, in his work found out that automating a particular task so that it can be done more quickly or cheaply, increases the demand for human workers to do the other tasks around it that have not been automated.

In Radiology, Barani view Enlitic's technology empowers practitioners, making average ones into experts. Rather than putting them out of work, the technology increases capacity, which may help in the developing world, where there is a shortage of specialists. While it is easy to see fields in which automation might do away with the need for human labour, it is less obvious where technology might create new jobs. [14]

We have so far seen some of the positive and negative impacts of many new innovative revolutions that had come into existence but failed to address the effect on the economy and how to recover from it. It is on this basis that the researchers streamlined their research to the Nigerian economy before it is too late.

It is frustrating that our educational system in Nigeria is doing a pretty good job by turning out the kinds of workers we needed many years ago. Basic skills, the ability to follow instructions, execute defined tasks with some level of consistency and reliability. What is needed are people who can do something like negotiating, provide loving and compassionate care, motivate a team of people, design a great experience, realize what people need or want and figure out the next problem to work on and how to solve it.

There is a danger of disruptions and unrest from large group of people who are not working. That creates poverty and social dissatisfaction and runs the risk of instability for the society as a whole. Stability cannot be enforced through police, civil defense or military presence. There needs to be ways for people to live fulfilling lives even if society needs relatively few workers. Government should formulate policies that encourage volunteerism and reward those who contribute to worthy causes that make sense from the standpoint of society as a whole.
Adoption of these steps help people adapt to the new economic realities.

IMPACT OF ROBOTICS ON THE ECONOMY

The emergence of this 21st century technological innovation will affect Nigerian economy both positively and negatively. Though, the negative effect of it can be overcome if adequate measures are put in place by the government.

i. Impact on the workforce

The big data revolution and improvements in machine learning algorithm means that more occupations can be replaced by technology, including tasks once thought quintessentially human such as navigating a car or deciphering handwriting.

Statistics of jobs risk percentage being replaced in some countries by World Bank development report (2016): [20]

SN	COUNTRY	PERCENTAGE OF JOBS AT RISKS
1	Nigeria	65%
2	South Africa	67%
3	Ethiopia	85%
4	United States	47%
5	United Kingdom	35%
6	Thailand	72%
7	Argentina	65%
8	China	77%
9	India	69%
10	OECD Average	57%

Though, these are theoretical risks but technology exists or is within reach and that means these jobs could be done by robotic machines, but it doesn't necessarily mean they will be but rather optimistic about the future of automation and robotics in the workplace.

Many of the technological firms have achieved broad economic scale without a large number of employees. For instance, Derek Thompson writes that "Google is worth $370 billion but has only about 55,000 employees which is less than one-tenth the size of AT&T's workforce in the 1960's [2]. If Google had displaced people of their jobs; many new jobs were created in both formal and informal ways. So it is hard to quantify the way and manner in which robots will affect the workforce.

ii. Productivity growth

Higher standards of living can come through higher wages, lower pricing of goods and services, and an overall greater variety of products and services. Growth results from one or mixture of three things: increases in the quality of labour, increases in capital and Total Factory Productivity (TFP) which is known as multi-factor productivity. Remember, the higher the wages the higher the price of goods and services so that the private enterprises can cope with the market trend. Increase in the quality of labour comes from more and better education and training of employees. Capital drives productivity growth via investments in machines, computers, robots and other items that produce output. Total Factory Productivity (TFP), often cited as the most important source of productivity growth, that comes from the synergies of labour and capital working together as efficiently as possible. Even if the human component of factories such as education and productivity of the workforce remains constant, increased efficiencies from robotics inevitably will lead to more productivity growth. [16]

iii. GDP growth

Increase in productivity brings an increase in Gross Domestic Product (GDP). Geog, (2015); studied the effects of robots on the economy of 17 countries and found that the increasing use of industrial robots over the time period of 15 years raised the annual growth of GDP by 0.3% [16]. The GDP of Nigeria as at May, 2017 stood at -0.52% and indicating that it is rising.

iv. Job creation

Robots are actually creating new, high-paying jobs that require skill acquisition and replacing low-skilled workers. For instance, in manufacturing, robots can perform menial tasks such as raw materials sorting, transporting and stocking, while higher-skilled play roles such as quality-related tasks, which humans are more suitable for, can be completed by higher-skilled workers. [16]

v. Taxation

It is a known fact that companies and industries pay taxes to government as well as PAYE tax paid by employees. The question now is that if humans are replaced by robots; then what will be the tax remittance position of robots? If these robots are not paying taxes then the net effect is sharp reduction of internally generated revenue (IGR) accruing to the three tiers of government which will adversely affect every sectors of the economy.

III. Findings And Discussions

We have seen that the risk of jobs being replaced by automation and robotics varies from one country to another. Nigeria in particular which is our focus of study has the risks of 65% from the statistics and so what is the preparation of government to cushion this effect per adventure it comes as predicted by some researchers?. Similarly, the tax that is one of the sources of government revenue is being threatened by this innovations. If the U.S government that is a developed country is warned to be prepared for the upcoming threat posed by this development, then what is a developing country like Nigeria doing in other to forestall any eventuality emanating from this human-like machine?. Presently, the unemployment rate is very high in Nigeria; then come to think of it if 65% of the workforce is retrenched? What will be the aftermath of it and the taxes they are paying on the economy? Replacing humans with robots will increase productivity and in turn reduce the price of goods and services because of the reduced cost of training and retraining of manpower. Welcoming this innovation in Nigeria means a tremendous increased in our GDP from negative to positive growth.

The findings show that as jobs are being lost to robots, so also new ones open but they are meant for skilled workers. This was evident during the emergence of ATM machine in Nigeria when bankers thought that the introduction of ATM will make many of them lose their jobs but it eventually creates more jobs as more branches were opened and manpower was needed to maintain, load the ATM with cash and as well update the software in order to meet the ever increasing customers demand.

Despite these, the Nigerian government needs to put machinery in place to have a divergent preparation of what area to move when this massive new technological revolution takes place. The federal government should be prepared on what to do if employees taxes are lost to robotics.

IV. Conclusion

The robot has been described as the greatest invention of man after the mobile revolution that kicked off in 2007 with the launch of iPhone. Apple and Samsung were the biggest winners while Microsoft was among the big losers, as its 20-year monopoly on personal computing was broken. As M'bow-former UNESCO scribe rightly pointed out over a decade ago, "Information Technology has opened up such tremendous vistas for modern societies that any failure to master it would mean a life of permanent subordination". (Sic) [4]

Since robotics and machine learning have improved productivity and enhanced the overall economy of developed nations, countries that invest in innovation will see tremendous growth in overall economic performance in the future.

This technology among others has been able to raise the standard of living of mankind as well as the entire world. Nigerian government should urgently put machinery in place to tackle the enormous challenges that this new technology might pose on the economy by making a constitutional provisions as enshrined in our recommendations.

i. Nigeria government should make a constitutional provision for continuous education of skilled, unskilled and unemployed individuals in other skillful areas that are employable other than the ones we have in this present day generation. They should establish "Individual Activity Account" which provides social benefits. This account should be funded by individual, company that the individual works and as well as government just like pension contributory scheme. The goal of this account is to provide incentives for continuing education. As emerging jobs are going to require different skills than what people gain in school today, the owner of the account could draw on it to finance lifetime learning and job retraining expenses since it is portable.

ii. Since every robot that can perform a task has name, then they should pay tax to the government so that the economy will not go into recession.

iii. The school curricula need be overhauled so that students are not trained for jobs that may no longer exist and encourage continuing education and access to arts and culture for adults so that they can expand their horizons throughout their lives. Advanced economies need to determine ways to avoid a permanent underclass with limited prospects or employment possibilities.

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