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DIGITIZATION AND THE FUTURE OF JOBS IN NIGERIA

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Abstract
In this age of digital revolution, every progressive nation is strategically diversifying its educational, economic, and non-formal sectors towards creating a more digitally compliant and information technology-driven society. This paper studied digitization and the future of jobs in Nigeria. Ten companies and industries were selected from each of the ten industrial cities in Nigeria (Lagos, Port Harcourt, Onitsha, Nnewi, Aba, Jos, Abeokuta, Warri, Kano and Kaduna). From the responses to the research questions, it was discovered that presently there is a serious digital skill gap that needs to be filled. As digitization tends to increase, the use of robots will proliferate. Results showed that 85% of the companies surveyed affirmed that they would employ robots in the coming years. This implies that about 62.7% of the jobs will be undertaken by robots. The authors proposed the implementation of a humanism model in our educational curriculum. The balance between digitization and humanism enhances a more robust, digital-driven, progressive, and economically viable society.

Keywords: Digitization, Digital Economy, Digital Revolution, 4th Industrial Revolution (4IR), Humanism Model.

Introduction

Our world is presently experiencing the proliferation of new technologies, which have thrown us into a digital revolution. There is hardly any aspect of our lives that does not require one form of digital skill or another, from operating household electronic gadgets to using smartphones to doing online banking, accessing e-government platforms, applying for online jobs, accessing e-learning resources, booking appointments and booking of travel tickets online, etcetera. With the advent of increased broadband mobile networks, internet services have been enhanced to meet the demand of the teaming population that depend on online services for their work, business transactions, transportation, communication, learning and research.

Every day new technologies continue to emerge. Over the past decades, the digital space has been making steady progress with the emergence of various digital innovations like; nanotechnology, 3D printing, big data, cloud computing, edge computing, artificial intelligence, machine learning, robotics, blockchain, smart mobile technology, self-driven/autonomous vehicles, drone technology (for aerial surveillance, space exploration and military interventions), Internet of Things (IoT), Internet of Vehicles (IoV), Smart Homes, Smart Cities and more recently quantum computing, Augmented Reality, 5G & wifi 6, etc. These new technologies undoubtedly have influenced the way we live, do business, carry out our daily work and interact with our environment. The digital transformation has brought about improvements in every aspect of our existence. With a simple click or tap of the finger on our mobile device, we can access any information from any part of the globe. Teaching and learning have been made a lot easier with unlimited access to online research resources and e-library. You can virtually learn everything visually by clicking any subject of interest on YouTube.

Our present-day society is fast changing to an information and digital literate age. For one to stay relevant and flow with the tide of this digital transformation, one must update from the obsolete analogue world to acquiring one form of digital skill or the other. As the wave of digitization continues to accelerate, there is a need for continuous development of our digital skills so as not to be left behind in the schemes of our changing world. As much as we enjoy lots of benefits from digital innovations, they also come with various challenges. The first challenge is how to catch up and fill the digital skill gap created by the new inventions. New inventions come with a new demand for digital skills to drive the emergent processes in the digital economy. There is also the

challenge of losing most of the jobs presently undertaken by humans to robots. This is a worrisome aspect as it tends to threaten the income and sources of living of the teaming working class. Digital transactions to some great extent expose users to internet scammers, and to vulnerable and enticing sites—leading to cyber-attacks, loss of precious data and loss of online treasures and financial resources.

Notwithstanding these challenges, the digital revolution has improved our lives and will continue to do so as the world progresses. From the international perspective, progressive economies heavily rely on digital technologies to drive their social, economic, political and educational programmes to improve the standard of living of their citizens. In this modern age, civilization is not only measured by the level of industrialization of a country but also by the level of digital sophistication and the high index of digital literacy of its citizens.

The purpose of this article is to study digitization and the future of jobs in Nigeria. It is aimed at investigating the effect of digitization on job creation and its future result in job losses. The objectives include; ascertaining how industries respond to the digital revolution, finding out the opportunities and challenges of digitization, and finally, understanding the humanism model designed to mitigate job losses due to further digitization.

Nigeria as a developing economy could be said to be undergoing some transformations geared towards improving her digital economy. These include but not limited to;

(i) Establishment of the Ministry of Communication and Digital Economy
(ii) Launching of National Digital Economic Policy and Strategy (2020-2030), NDEPS, in 2019.
(iii) Establishment of the National Information Technology Development Agency, NITDA.

These agencies, ministries and departments are to drive government programmes both in the formal and non-formal sectors to develop a pool of digital skills, enhance digital business startups, entrepreneurial development, and job creation and improve the digital literacy and numeracy of the citizens.

Data from the National Bureau of Statistics (NBS, Dec. 2020) revealed that the ICT contribution to GDP increased from 12.46% in Q2, 2015 to 17.83% in Q2 2020, and this is expected to triple in the 2030s. This is greater than the contribution to GDP from the oil sector (8.9%) in the same quarter. Telecommunications and Information Services are two sub-sectors that have continued to contribute to the existing growth of the ICT sector in Nigeria year after year.

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Figure 1 - ICT contribution to real GDP (Q2 2015 - Q2 2020)

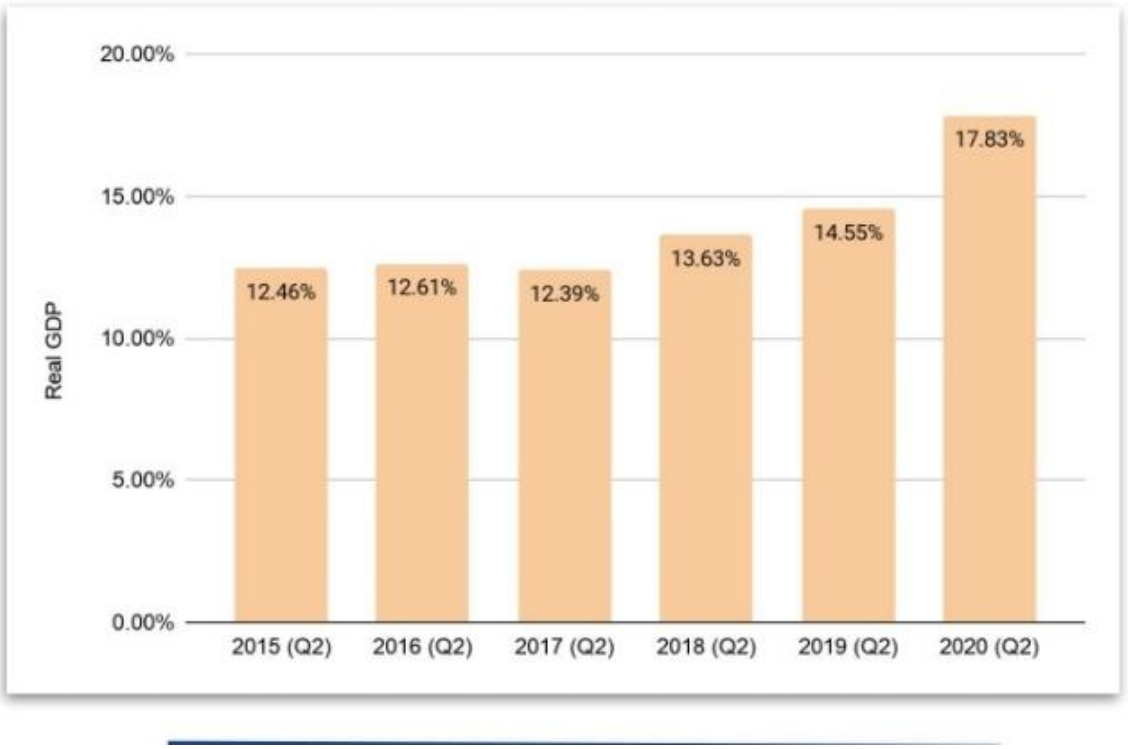

Figure 1 shows ICT's contribution to GDP from Q2 2015 - Q2 2020.
Source: *National Bureau of Statistics (NBS)*

Nigeria has the largest mobile market (phone users) in Africa and this is supported by growing broadband infrastructure and internet connectivity. In Nigeria, the number of internet subscribers has grown from 200,000 in the year 2000 to 126 million in 2020 with a 61% penetration. From a continental perspective, increasing internet penetration by 10% can potentially increase GDP per capita by 2.5%, while increasing internet access to 75% can create 44 million jobs in the continent (e-Conomy Africa, Nov. 10, 2020, para 2).

Nigeria's labour market is already characterised by high unemployment and underemployment rates. According to recent data from the National Bureau of Statistics (NBS, Dec. 2018), 1 in 4 Nigerians is unemployed (27.1%), while the number is worse for young people (15 - 35 years) with 1 out of 3 being unemployed (34.9%). Similarly, the country has a combined (unemployment and underemployment) unemployment and youth unemployment rate of 55.7% and 63.1% respectively.

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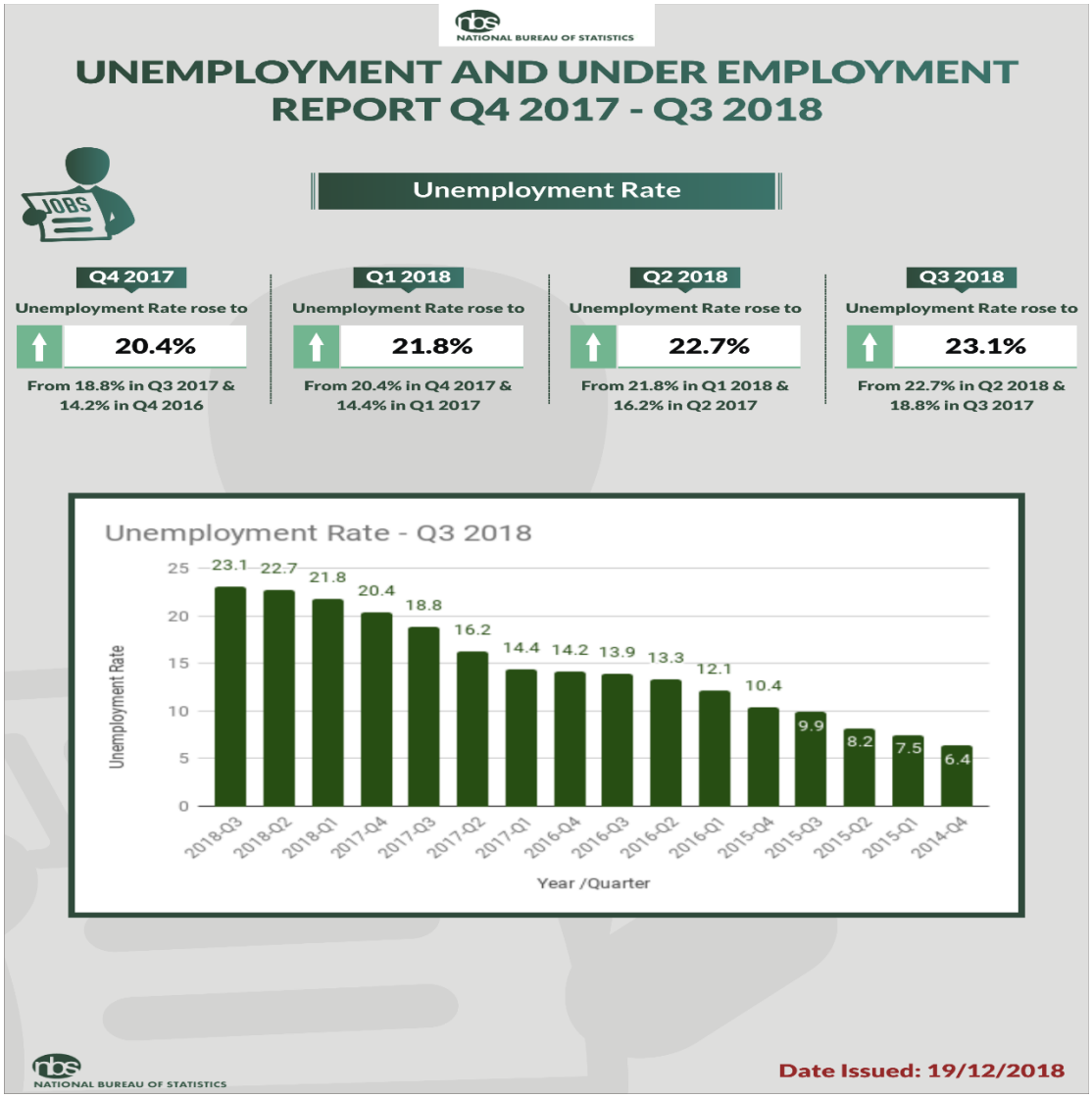

Figure 2: Unemployment and Under Employment Report, Q4 2017 – Q3 2018.

Source: *National Bureau of Statistics (NBS)*

On the 28th Nov. 2019, the President launched the National Digital Economy Policy and Strategy (2020-2030), NDEPS. The vision is "to transform Nigeria into a leading digital economy, providing quality life and digital economies for all" (NDEPS, 2019, November). This prompted the re-designation of the Federal Ministry of Communication as the Federal Ministry of Communication and Digital Economy (FMoCDE) on the 17th Oct. 2019 which expanded the mandate of the ministry to include a key aspect of the priority areas set for the ministry by the Federal Government, which is the "development and implementation of a digital economy policy and strategy". The Digital Economy Policy and Strategy document aims to provide a plan for using digital technology as a platform for stimulating growth in all sectors of the economy through the development of a digital economy for the country.

To drive the digital economy, it is important to develop a large pool of digitally literate and digitally skilled citizens. Hence, the need to develop the digital sector and proliferate the emergence of many digital entrepreneurs. Entrepreneurship plays an important part in the development of the digital economy and the creation of new jobs. Policies are needed to build a regulatory environment in which businesses can thrive and fail, with easier access to finance for small innovative firms, lighter procedures for start-ups and lower failure costs.

Osuagwu et al. (2015) writing on *ICT and Pragmatism: Creating Sustainable Employment for Graduates in Nigeria,* posit that; the actualization of job creation via the Internet will depend to a large extent on the provision

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of the required ICT infrastructure and the promotion of broadband stimulus by government for extending internet access to the remote communities of Nigeria. Going further they suggested that the government would need to make more investments in Information Technology infrastructure and promote stimulus for broadband diffusion as a solution for web job creation. Internet technology today is a prerequisite for national economic growth. Nigeria may fail to fully utilize the benefits of this technology however if the attendant bottlenecks such as poor electricity supply, lack of effective e-payment system, restructuring/retooling of IT curriculum in our tertiary institutions towards the direction of the new National Innovation Institutions formula, reinforcement of EFCC capacity to fight internet criminality and acquisition of extended capacity in Computer Forensics.

The UNESCO project on; *Empowering Nigerian Youth with The Skills To Develop Mobile Apps and Computers;* had as their main objective; "To address the challenge of unemployment by equipping young women and men with the necessary skills and confidence to fully meet the labour dynamics of the digital society" (UNESCO YouthMobile Report 2018, 28 Jan. 2019, p. 9). These are their expected outcomes;

1. Strengthened Institutional Capacity to engage youths in mobile app development and ICT for sustainable development and livelihood.
2. Increased Youth Capacity on YouthMobile Initiative for sustainable employment and Job creation.
3. Increased Government/Private sector cooperation for youth development in ICT empowerment.

Jobberman Nigeria (2020), explained that Nigeria's booming youth population and the increasing contribution of the digital sector to GDP show promising potential for Nigeria's economic outlook. With the ICT sector leading in terms of its contribution to national GDP (17.83%), Nigeria's digital economy presents a unique opportunity for employment and job creation. However, this will require improvements in digital skills and literacy among young people. Although young people are described as digital natives, there is a digital literacy gap which excludes young people from harnessing the opportunities that the digital economy presents.

International Telecommunication Union (2020), clearly stated that "As the world struggles to fashion a 'new normal' for the post-pandemic era, it is more apparent than ever that the ability to leverage digital technologies will be vital to the future resilience and prosperity of nations, communities and individuals. Digitization in various industries transforms the workplace to ensure effective tasking, business and field resources optimization, high competitiveness, greater interaction and inclusion between workers, fast and efficient responses to customers, innovative services and economic growth."

The digital skills required in this new digital economy must be taught to minimize the risk of a digital skills gap (Strack et al., 2019). Various forecasts in different reports (Manyika et al., 2017) predict the creation of several million new jobs worldwide with these emerging technologies, as well as the displacement of existing roles. Those forecasts should be carefully analysed by each industry, as recommended by Gartner Research (2019), to build a strategic skills training plan suitable for the relevant workforce. This plan should begin by identifying the requisite digital skills for the corresponding industry before determining its adoption pace.

"The Future of Jobs Report" (World Economic Forum, 14 Sept 2018, pp. 15-18) shows a set of digital technologies that might be adopted by different surveyed companies in different industries. Those technologies are, either related to software applications running locally on computers and/or smart tablets, or running remotely over cloud services. Those technologies are also related to the manufacturing and deployment of new AI algorithms for automation, advanced manufacturing robots, and connected devices that are either running in the information and communication technology industry or in vertical industries such as health, agriculture, construction, finance, etc.

Digitization — the mass adoption of connected digital services by consumers, enterprises, and governments, has emerged in recent years as a key economic driver that accelerates growth and facilitates job creation. In the current environment of a sluggish global economy, digitization can play an important role in assisting policymakers to spur economic growth and employment. Strategy and Econometric analysis estimate that, despite the unfavourable global economic climate, digitization provided a US$193 billion boost to world economic output and created 6 million jobs globally in 2011 (El-Darwiche et al., 2013).

Writing on the *Impact of ICT and Digital literacy skills on Teaching and Learning Processes in Nigerian Colleges of Education*, Ademola et al (2018), noted the advantages of digitization in the educational system to include the following: faster lecturer-student communication, cooperative learning among students, helping to locate/finding teaching materials, complementing classroom instructional materials, time-saving with the use of grading software. However, they pointed out that digitization and ICT technologies are cost-demanding in terms

of procurement and training of the required manpower for their operation and maintenance in our educational system.

Relating digital skills to the future of business in Nigeria, Olaniyi (2022), noted that; Digitalization in Business Education programmes will go a long way in developing the students' ICT skills, intellectual and competencies needed in the establishment of business enterprise and making them employable in the workforce. For effective entrepreneurial practice in the present technological dispensation, the acquisitions of basic digital skills by graduates of business education are of paramount importance vis-a-vis ICT communication, technology, organization and management skills. These are not only true for Business education graduates but also relevant to those from other disciplines.

International Telecommunication Union, ITU, (2020) research discovered that tens of millions of jobs will be created in the coming years for people with advanced digital skills. In addition to existing skills gaps, experts also forecast that advances in areas like artificial intelligence, nanotechnology, 3D printing, and other technologies will usher in a new era that will radically alter patterns of consumption, production, and employment.

But it must be noted that as millions of jobs are being created presently in the digital economy, further advances in digitization will ultimately result in a shortage of jobs for humans, with robots taking most of the jobs in the coming years. This is what this paper is envisaging.

Digitization and Its Impacts in Our Daily Lives

The recent explosion by the fourth industrial revolution (4IR) aided by machine learning, artificial intelligence, big data, cloud computing, the Internet of things (IoT) etc has resulted in the creation of many jobs. Every aspect of our daily life has one way or another been influenced by the emerging trends in the digital space: business, education, entertainment, governance, transportation, communication etc. Most businesses these days are transacted online through the internet. Teaching and learning are taking place , the lecturer will be thousands of miles away teaching and interacting with his students through multimedia channels. The entertainment industry has been enhanced by various social media platforms like Facebook, YouTube, TikTok, Instagram etc which allow the artiste to reach the worldwide audience with ease and at very minimal cost. Government activities these days have been made easy through the various E-government channels. The ***www.services.gov.ng*** portal provides a one-stop portal for accessing government services—you can access various ministries, departments and agencies online, communicate with them, fill out forms and submit online, book appointments online etc. This has resulted in the ease of transacting government business, cost reduction, crowd decongestion in offices, time-saving, stress reduction, etc. In the area of transportation, digitization has made a lot of positive gains. Flight schedules can be accessed online and flights can also be booked online without the need of going to the air company or travelling agencies. Taxis like Uber and Bolts are accessed and booked online once you have their apps installed on your smartphones. There are now autonomous or self-driven vehicles that can take you to your destination seamlessly without a driver! The explosion in the communication industry is unimaginable. With the smartphone in your hand, you can reach the whole wide world in a split of seconds either using Whatsapp, Facebook, telegram, email, Instagram, Twitter, or YouTube.

Life has been made a lot easier by the progress made in the digital industry. Day-by-day research is ongoing to improve the existing systems to serve the masses better.

Incorporating Digital Literacy in Our Educational System

There is an urgent need to improve the education we give to our children from kindergarten to the tertiary level. In line with the Policy objective and action plan of the NDEPS, Digital skills should be incorporated into the curriculum and the schools equipped with the requisite technologies to impart these skills. Kids in kindergarten should learn to operate toy laptops, iPads, smartphones and other digital machines and display devices. They should be acquainted with the workings and operations of digital gadgets as they grow up. As they progress in their education career through to the primary and secondary levels, they should be allowed to undertake various projects that will improve their digital skills as well as internalise the techniques and innovations that will position them holistically in the digital world. The curriculum should incorporate periods of industrial attachment at various stages in their secondary and tertiary levels. This will give them real-world exposure in the digital industries. Within these periods of industrial attachments, they will acquire various hands-on training, get acquainted with smart technologies and receive first-hand practical exposure to digital innovations and operations. By the time they graduate from tertiary institutions, they must be fully equipped with the requisite digital knowledge and skills to do well in their chosen career.

Digital know-how is not only needed in the science and engineering disciplines but virtually in every aspect of our human life, social science, agriculture, entertainment etc. The world is transforming digitally every day, every aspect of our world is experiencing one form of digital revolution or the other. You do not need to be an engineer or technologist before you own and use laptops, smartphones, self-driven cars and other smart devices hence the need for everybody to follow the trend of digital developments to be relevant in the emerging new technologies, innovations or discoveries through artificial intelligence, 3D technologies, cloud computing, edge computing, etc.

Participants from the ***Digital Nigeria*** Conference held last year in October. 2022 at Abuja, advocated**;** "All formal post-secondary education, including public and private universities, colleges, technical training institutes, and vocational schools should be adequately equipped with digital infrastructure to parade sound talents that meet the local and global requirements" (National Information and Technology Development Agency, 2022).

The Digital Nigeria programme is intended to help Nigerians imbibe the following skills: (i) Analytical thinking and innovation; (ii) Active learning, (iii) Creativity; (iv) Tech Design; (v) Critical Thinking; (vi) Complex Problem Solving; (vii) Leadership and Social Influence; (viii) Design Thinking; (ix) Emotional Intelligence; (x) Reasoning; and (xi) System Analysis.

Digitization, Job Creations and Future of Jobs

We conducted research by selecting ten companies/industries from each of the ten industrial cities in Nigeria. These ten cities of our choice included; Lagos, PortHarcourt, Abeokuta, Onitsha, Aba, Nnewi, Warri, Kano, Kaduna and Jos.

The following were the research questions which we attempted to obtain answers for;

1) How have digital technologies/digitization enhanced your company/organization?
2) Has digitization increased your job creation or decreased it?
3) What roles are presently undertaken by humans in your company?
4) What roles are presently undertaken by robots in your company/organization?
5) Do you hope to increase the use of robots in the next 10 to 15 years?
6) If 'yes' for 5, state your reasons.

The following are the reasons gathered for the increase in the use of robots; cost effectiveness, efficiency in production, little or no loss of man-hours, increased output and profit margin etc. Results showed that 85% of the companies surveyed affirmed that they will employ the use of robots in the coming years. This implied that about 62.7% of the jobs will be undertaken by robots.

The research methodology adopted provided answers to the research questions and in addition, gave us an insight into the Nigeria digital sector landscape presently. The methodology also helped us to forecast what the digital landscape will look like in the next 10 to 15 years from now.

Our primary sources of data collection were; online surveys and interviews, while the secondary sources included a review of relevant literature and policy documents. The use of both sources is to properly validate the quality of data collection and enhance the intellectual rigour of the evidence gathered.

From our survey, we could establish that with the current wave of the 4IR and from the outcomes of the 2020 pandemic and its effects in the post-pandemic era, there is presently a remarkable advancement in digitization with the proliferation of digital skills and digital entrepreneurship all over the world. There is a clear-cut skill gap existing between the digital industries on the demand side and jobseekers on the supply side. With the current pursuit of digital knowledge and skills by many jobseekers to enhance their job opportunities and increase their earnings, a time will come shortly when an equilibrium will be reached, that is; when the available jobs in the digital job market will be matched by the teeming job seekers. Further increase in digitization will then result in throwing many out of jobs with robots taking most of the jobs formerly undertaken by humans. This is already a current reality in some industrialized nations like Germany, Japan and China.

Robots and Jobs

In this age and time, labour experts are increasingly and justifiably worried that computers are becoming so adept at human capabilities that soon there will be no need for any human input at all. The evidence of this assertion by Ford (2015) is everywhere around us e.g. autonomous or self-driven vehicles, analysis of stocks by robots, prescription of drugs by robots, weather forecasting by robots, writing deft and informative prose by

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robots, interaction with customers by robots, etc. Nowadays in China, there are "co-bots" which are machines that can work in factories safely alongside human beings, allowing fewer labourers to be vastly more productive. In 2015, sales of industrial robots around the world increased by 12 per cent over the previous year, rising to nearly a quarter of a million units (Pooler, June 2016). Before now, low-skilled jobs had been largely threatened by automation. These days, every job even highly skilled jobs like interpreting medical images and giving medical prescriptions, doing legal research and analysis, data analysis, diagnosing disease symptoms etc are now within the purview of machines and are now overtaken by robots (Lopatto, 2015).

To stay relevant in this new economic and technological reality, job seekers should be equipped with a career model with the literacies and skills needed to thrive in this new digital economy. As the job landscape continues to grow more complex and unpredictable, education remains the ladder by which people can climb to higher economic status. Therefore, there is a need to reconfigure the present educational curriculum from the primary to the tertiary level to mitigate the challenges in the future of jobs driven by digitization and robotics. No matter how versatile robots take up jobs previously done by humans, there are still very many jobs that robots cannot undertake, e.g., taking care of infants, working in old people's homes and infirmaries, crafting wines, cooking our favourite dishes, healing our environment, creating various artworks, poems, and songwriting, creating content to drive the entertainment industry, etc.

The Humanism Model

To withstand the tsunami of robots in the job market, this paper proposes a ***humanism model*** to be incorporated into our educational system. This model lays greater emphasis on equipping the students to thrive in those areas that robots cannot adequately undertake, which are not routine and repetitive. This will help them to develop their creative abilities to their full potential and make them robot-proof. The humanism model has a two-fold nature; (i) content and (ii) cognitive capacities. In content, it corroborates the old literacies of reading, writing, and mathematics with the new literacies; (i) data literacy, (ii) technological literacy and (ii) human literacy. Data literacy is needed to read, analyze and use the constant stream of big data, connectivity and instant information flowing from every click and touch of their devices. Technological literacy gives a grounding in coding and engineering principles while human literacy teaches humanities, communication and design, allowing them to function in the human milieu **(**Aoun, 2017).

The second aspect of humanism, which is cognitive capacity development, involves (i) systems thinking to view an enterprise, machine, or subject holistically, making connections between its different functions in an integrative way. Others include (ii) entrepreneurship, which applies an innovative and creative mindset to economic prosperity. (iii) Cultural agility—ability to live, work and thrive in various cultures and environments. (iv) critical thinking—which instils the habit of discipline, rational analysis and sound judgment. This body of knowledge, which can be constantly reviewed with the emerging trends in the digital revolution, can adequately equip the job seeker to find a place in the digital world and secure his future livelihood.

Conclusion

Shortly, our world and the people in it will be more connected, more competitive, and more digitally compliant. We can predict that computers, robots, and artificial intelligence will be even more intricately intertwined into the fabric of our personal and professional lives. Many jobs that exist now will have vanished while new, high-skill-demanding ones will be invented. No matter how the world changes with its challenges and opportunities, the humanism model presents a pathway to remaining relevant in a changing and digitalized world.

Suggestions

For further studies, the study suggests that:

1. further work be done on how increased digitization could sustain and optimally maximize the human workforce.
2. research should also be extended on how to acquire up-to-date digital skills to retain jobs in this age of the fourth industrial revolution (4IR).

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