

# Fourth Industrial Revolution and Business Education Programme in Nigeria: Challenges and Opportunities

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## **Abstract**

*The fourth Industrial Revolution (4IR) is all about changing technologies and trends such as the Internet of Things (IoT) and artificial intelligence (AI) that will have broad and deep impact on all aspects of life such as education, health and business. The purpose of this paper is to determine the challenges and opportunities of 4IR for humanity in general and Business Education Programme in Nigeria in particular based on a desktop study. The concept of Industry 4.0 and historical development of Industrial Revolutions (IRs), emerging challenges brought by the 4IR with its opportunities were briefly analyzed. The paper equally examined Business Education programme in Nigeria with myriads of problems undermining effective training of students to meet the challenges of global technological age. For Business Education Programme in Nigeria to meet the challenges posed by the 4IR, the paper recommends among others; the need for curriculum review to meet the 21<sup>st</sup> Century skills need of the industry, adequate funding of the programme in the area of ICT adoption, training and retraining of business teacher educators, and collaboration between academia and the industrial sector.*

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**Keywords:** Industrial Revolution, Business Education, Challenges, Opportunities, Technology

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## **Introduction**

The world is currently in the midst of an industrial revolution with an exponential pace of change and it is disrupting every industry in every country. This revolution is different from the past three in terms of velocity, scope and impact. It is a digital revolution, characterized by a fusion of technology that is impacting every aspect of how we work and how we live, creating threats and opportunities (Paresh, 2018). According to Kayembe and Nei (2019), the Fourth Industrial Revolution (4IR) is the current and developing environment in which changing technologies and trends such as the Internet of Things (IoT) and artificial intelligence (AI) are changing the way we live and work. The 4IR presents a number of implications for skills development and

education. Some of these implications include reinventing education systems and strategic approaches to increase creativity and innovation.

According to Prisecaru (2016), the fourth industrial revolution may affect society and economy in a variety of ways among which are: first, a large portion of people around the world are likely to use social-media platforms to connect, learn, and change information. Second, a variety of innovative producers and competitors will have easy access to digital platforms of marketing, sales, and distribution, thereby improving the quality and price of goods and services. Third, consumers will be more and more involved in the production and distribution chains. The main effects of this revolution on the business environment are the impact it will have on consumer expectations, product quality, the move toward collaborative innovation, and innovations in organizational forms.

A trip outside Nigeria will give the reader a practical example. In most international airports in Europe, Asia, China and America, transit trains are no longer manned by humans. They are programmed to run and stop in designated areas as programmed. Today, out there, drones are about being commercialized to deliver products to the doorsteps of consumers. Robots are taking over from many humans in factories in Japan and others. The pace of technological innovation going on around the world will pose enormous challenges to people, companies and economies as they are fast changing the way people learn, work, live and stay alive. With the Nigerian educational system in disarray, with poor graduate turn-out, how ready is Nigeria as a country, its businesses and human resource managers prepared to meet the coming challenging fourth industrial revolution (Omoh, 2015)?

The driving force of the 4IR is the rapid proliferation of technologies that will have broad and deep impact on all aspects of life such as education, health and business. The question now is, how ready are we to face the impending challenges posed by innovations in artificial intelligence, biotechnology, nanotechnology, robotics and 3-D printing, among others?

The purpose of this paper is to determine the challenges and opportunities of 4IR to humanity in general and to Business Education programmes in Nigeria in particular based on a desktop study.

### **The Concept of Industry 4.0 (4IR)**

World Economic Forum (2018) defined Fourth Industrial Revolution (4IR) as the integration of human and technology intelligent systems that are fusing the physical, digital, and biological worlds with unprecedented consequences across different education disciplines, and pose significant challenges on how we learn, teach, and work.

The current categorizations of 4IR suggest that its adoption is not restricted to the use of a computer, especially in the education sector, and may involve other opportunities, such as the development of an ecosystem that may facilitate sharing of learning materials and data analytics to understand learners' teaching needs.

## Historical Development of Industrial Revolutions (IRs)

Min, Jeanne & Suk (2018) summarizes the historical development of industrial revolutions witnessed in the world as follows:

1. The first industrial revolution started in 1760 with the invention of the steam engine. The steam engine allowed the transition from farming and feudal society to the new manufacturing process. This transition included the use of coal as the main energy while trains were the main means of transportation. Textile and steel were the dominant industries in terms of employment, value of output, and capital invested.
2. The second industrial revolution began in 1900 with the invention of the internal combustion engine. This led to an era of rapid industrialization using oil and electricity to power mass production.
3. The third industrial revolution started in 1960 and was characterized with the implementation of electronics and information technology to automate production. Under the old ways, making things involved screwing or welding many parts together.
4. The fourth industrial revolution now involves computer generated product design and three-dimensional (3D) printing, which can create solids object by building up successive layers of materials.

**Table 1. Main features of Industrial Revolutions**

Period	Transition Period	Energy Resource	Main Technical Achievement	Main Developed Industries	Transport Means
I: 1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Train
II: 1900-1960	1940-1960	Oil Electricity	Internal Combustion Engine	Metallurgy, Auto, Machine Building	Train, Car
III: 1960-2000	1980-2000	Nuclear Energy Natural Gas	Computers, Robots	Auto, Chemistry	Car, Plane
IV: 2000-	2000-2010	Green Energies	Internet, 3D Printer, Genetic Engineering	High Tech Industries	Electric Car, Ultra-Fast Train

Source: Prisecaru, (2016).

## The Concept of Business Education

Business education is a conglomerate of courses that is concerned with the acquisition, development and inculcation of the proper values for the survival of the individual and the society (FRN, 2004). Further, Aliyu (2006) explained that business education is the education for the acquisition and development of skills and competencies, attitudes and attributes, which are necessary for efficiency of the economic system. Thus, business education helps individuals to acquire saleable skills that will enable them fit into various business organizations or be self-employed in the absence of paid employment.

However, the overall objectives of business education Programme in Nigeria as enshrined in the Minimum Standard for NCE (2008) were;

1. To produce well qualified and competent NCE graduates in business subjects who will be able to teach business subjects in our secondary and other related educational institutions.
2. To produce NCE business teachers who will be able to inculcate the vocational aspects of business education into the society.
3. To produce NCE business teachers who will be involved in the much-desired revolution of vocational development right from the primary and secondary schools.
4. To equip students with necessary competencies to qualify them for post-NCE degree programmes in business education.
5. To equip students with the right skills that will enable them to engage in life of work in the office as well as for self-employment.

Therefore, for business education to contribute fully to the economic and national development, it must wholly integrate ICT in teacher education to meet the challenges of the technological age. In view of this, Okoro and Okoro (2009) opined that business education that is not based on ICT will be classified as outdated and not in tune with the present realities because education is globalized and many nations agree to standardized their business rules, regulations and practice

## Challenges of 4IR

There are several key challenges brought about by the 4IR among which are the following:

i. **Disruption in the Labour Markets:** The revolution could yield greater inequality, particularly in its potential to disrupt labor markets. As automation substitutes for labor across the entire economy, the net displacement of workers by machines might exacerbate the gap between returns to capital and returns to labor. The scarcest and most valuable resource in an era driven by digital technologies will be neither ordinary labor nor ordinary capital; rather it will be those people who can create new ideas and innovations. In the future, talent, more than capital, will represent the critical factor of production. People with ideas, not workers or investors, will be the scarcest resource (Brynjolfsson, McAfee, and Spence 2014).

To Leswing (2017), the quest for talent will give rise to a job market that may become increasingly segregated. Computers and digitization will replace low skilled and low wage jobs. The higher paid jobs requiring more skills are less likely to be replaced. This increased dichotomization can lead to an increase in social tensions (Wolf, 2015).

ii. **Threats to Security:** There are a variety of challenges, such as cyber security, hacking, risk assessment, and others. Lambert (2017) opines that a higher level of alert is raised up when our lives become extensively connected to various devices, from our cell phones, cars, and light switches to our home security cameras, and smart speakers. One of the biggest trends in 2018 Consumer Electronics Show is that everything is connected and there is no going back (Goode, 2018)

Having everything attached to everything else in the IoT is going monumentally to increase the vulnerabilities present in any given network. The fourth industrial revolution calls for greater cyber security. Companies/Organizations will need to map their networks, assessing the risk and critical factors relating to security. Such an assessment should examine accessibility to systems, such as possible threats from internal sources, from disgruntled employees to internal human error, and external sources including hackers and cyber terrorists (Romney and Steinbart, 2017).

iii. **Frequent Curricular Changes:** Now in the 4IR, technologies really blur the lines between physical, digital and biological spheres. Disruptive innovation makes its way into higher education in which it redefines the conventional ways universities and colleges deliver their content to students. New modes of curriculum and teaching arise, and the focus changes from modes of teach to modes of learning. Alternative curriculums are being constantly developed.

iv. **Proliferation of new markets and products:** Disruptive innovation also reshapes how businesses operate. Thinking has really moved outside of the box. New markets are created and new products are defined. These offered similar product offered to customers in new ways. You could watch your shows from your home or get a ride somewhere (Jules 2017).

v. **Ethical/Moral Issues:** In an era, featuring Artificial Intelligence (AI), automation, robots, and genetic engineering, ethical concerns arises. On one hand, preventing genetic disease by genetic engineering is desirable. On the other hand, what guidelines, or regulation, or ethical boundaries should be established in order to prevent the over manipulation of genetics for vain desires? (Al-Rodhan, 2015).

### **Opportunities of 4IR**

Leading researchers argue that the fourth industrial revolution will shape the future through its impacts on government and business. People have no control over either technology or the disruption that comes with the fourth industrial revolution. However, we can predict the opportunities that come with the fourth industrial revolution:

1) **Lower barriers between Inventors and Markets:** Anderson (2012) argues that the 4IR is likely to reduce barriers between inventors and markets due to new technologies such as 3D printing for prototyping. New technologies, like this 3D printing, allow entrepreneurs with new ideas to establish small companies with lower start-up costs. The entrepreneur can bring the product 'to reality' with 3D printing, without the traditional time constraints often encountered with traditional prototyping methods. The typical barriers to entry are removed from the marketing equation.

2) **More active role for the Artificial Intelligence (AI):** Increasing trends in artificial intelligence point to significant economic disruptions in the coming years. Artificial systems that rationally solve complex problems pose a threat to many kinds of employment, but also offers new avenues to economic growth. For example, Manyika et al. (2017), predicts driverless cars may modestly replace taxi drivers, but autonomous trucks may radically transform shipping with far fewer jobs for truck drivers.

3) **Integration of different technics and domains (fusion):** Innovative technologies will integrate different scientific and technical disciplines. Key forces will come together in "a fusion of technologies that is blurring the lines between physical, digital, and biological spheres." (Schwab 2015) This fusion of technologies goes beyond mere combination. Fusion is more than complementary technology, because it creates new markets and new growth opportunities for each participant in the innovation. It blends incremental improvements from several (often previously separated) fields to create a product.

4) **Improved quality of our lives (robotics):** robotics can and will change our lives in the near future. Technically robots are automated motorized tools. They cook food, play our music, record our shows, and even run our cars. However, we just do not see it because robots do not have a face we to whom we can talk or a butt we can kick. Consequently, robots have the potential to improve the quality of our lives at home, work, and many other places. Customized robots will create new jobs, improve the quality of existing jobs, and give people more time to focus on what they want to do.

5) **Connected life (Internet):** Internet of things (IoT) is the Internetworking of physical devices. Typically, the IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications. To Holler, et al. (2014), the interconnection of these embedded devices is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities. Now, the Internet is connecting personal computers and mobile devices. "By 2010, the number of computers on the Internet had surpassed the number of people on the earth," (Gershenfeld and Vasseur 2014).

### **Challenges of 4IR to Business Education in Nigeria**

However, business teacher educators in higher institutions of learning in the Nigeria are lagging behind in exploiting and embracing the opportunity associated with 4IR in facilitating teaching and learning of the subject matter. Even though computers are used in teaching and learning of

business education in many higher institutions of learning in the country, it should be noted that 4IR is beyond the use of computers and it has the capability to disrupt the way students are taught and engaged themselves in learning of the subject.

A critical analysis of the way and manner business education programmes are managed in Nigerian higher institutions of learning revealed an ugly situation, among which are:

1. Sani (2014) reported that the current curriculum design and pedagogical practices for the development of ICT literacy and competence of pre-service teachers in Nigerian Colleges of Education is yet to produce the desired result.

2. A study conducted by Samson and Okereke (2014) revealed that there were no enough computers for students learning and the laboratories are not always open for students.

3. A look at the performance of business education in many Nigerian Universities reveals that Microsoft Excel, database management, basic computer networking, desktop publishing, web page design etc. are not included in their business education curriculum (Azih, 2011).

4. Okereke & Ndinechi (2005) in their study found that business education graduates were unfamiliar with networking, computer assisted retrieval system, electronic mails, organizer, micro graphics, teleconferencing equipment etc. There seems to be lack of innovation in the current business education curriculum and the Nigerian school system has remained conservative, thus, being too slow to adapt to new technologies.

5. Anioke (2012) observed that there is a wide gap between what is studied in Nigerian tertiary institutions and the requirements of the industries in today's corporate organizations.

The current business education curriculum in Nigeria as observed by Okoli (2011) is highly theoretical and rhetorical in nature. Thus, the graduates of business education programme lack the skills and competencies needed for actual performance in the office. Furthermore, business education in Nigeria is saddled with the following problems:

- i. Inadequate funding
- ii. Inadequate resource personnel
- iii. Poor curriculum content
- iv. Inadequate instructional materials
- v. Poor societal perceptions.

Despite the above mentioned problems, there is good hope for catching up with the emerging technological challenges if the needful is done. According to Paresh (2018), Skills that we learned in formal education are now becoming irrelevant. With technology evolving so quickly, corporate education and training programmes are lagging behind and are in desperate need for transformation. In addition to the traditional core curriculum of business pedagogy, business schools should begin to focus on education in areas like computers, big data, artificial

intelligence (AI) and designed thinking to enable consistent training for all areas of business, especially in management and leadership.

## Conclusion and Recommendations

The paper examined the challenges and opportunities of 4IR to in general and specifically to Business Education programme in Nigeria. The paper concluded that automation, digital platforms, and other innovations are changing the fundamental nature of work and the disruptive changes that emanate from the 4IR will have a profound impact on the employment landscape, business models and perhaps more importantly on business education. Although the paper is a reviewed one, there is need for empirical study on the challenges and opportunities of 4IR on Business Education programmes in Nigerian higher institutions of learning. Based on the deductions from the study, the following recommendation are made:

1. Computer laboratories should be established, well-furnished and properly networked for teachers and students to take full advantage of shared educational resources.
2. There is urgent need to increase investment in Business Education to be able to equip students with the skills and knowledge necessary to produce quality graduates in the area of robot engineering, industrial engineering, data analysts, cloud architects, software developers, security analysts, etc.
3. There is the urgent need for the review of the existing curriculum in operation towards imparting of complex, problem-solving skills, creative skills and social skills, critical thinking, etc., to enable students meet the 21<sup>st</sup> skills needs of the 4IR.
4. There is the need for mutual collaboration between industry and Academia in Nigeria to ensure that students' training is in tandem with the demand of the industrial sector.

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