

# Artificial Intelligence and the Future of Work: Recent Graduates' Perspective

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## Abstract

*Recent technological developments suggest that sooner or later, Artificial Intelligence (AI) will become an indispensable technology. With the developed countries leading in the development and deployment of AI, it is therefore a plausible claim that students and recent graduates of schools in the Global North may be familiar with the technology. For Africa, this is unclear. This paper therefore assesses the level of fresh graduates' awareness and their level of preparedness for prospects, issues and possible threat that AI may pose in their future work life. Specifically, the project profiles students according to their current level of AI understanding, assesses students' perception of its potential threat and assesses their level of preparedness to use the technology. A total of 112 recent graduates from various Nigerian tertiary institutions serving in the mandatory National Youths' Service Corps (NYSC) were randomly selected to respond to fill the survey. Descriptive Statistics and Multinomial Logit Model were analytical techniques. Results show that most of the graduates are essentially ignorant or unsure of the threat of AI to their lives and especially for the foreseeable future. These categories of graduates are within the ranks of class lower than First Class. Further, almost all the graduates are unaware of any policy concerns of the government on ICT and AI. Nevertheless, almost all of them were willing to pay to learn about AI. The apparent ignorance of the potentials – positive or negative – of AI among the graduates in the case study country of Nigeria reveals a deficiency in curricula and highlights the need for a more robust policy response from government. The study raises significant concerns and questions about not only the currency of higher education curricula in Nigeria, but also in Africa broadly, in addition to young people's readiness to survive and thrive in the digital future of work.*

**Keywords:** Artificial, Intelligence, Future, Technology, Global

## 1.0. Introduction

The future of work has been an issue of concern since technology and its use became more modern, sophisticated and efficient. Period of industrial revolutions till the digital era was known for application of technologies for mass production of goods and services. Since the latter part of the 20th century, automotive technologies were feared to be counterproductive. Key challenge has been unemployment through labour substitution<sup>1</sup> and its consequences – increase in the level of social vices and crime in the society [MGI 2017a]. The overall effect is the loss of human dignity that labour was originally intended for. While debate between mass production of goods and

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<sup>1</sup> Pope John Paul II expressed fears concerning the loss of human dignity due to loss of their jobs which in turn is due to employers employing technology especially AI more than or instead of employing humans. See details on this link: [http://www.vatican.va/content/john-paul-ii/en/encyclicals/documents/hf\\_jp-ii\\_enc\\_14091981\\_laborem-exercens.html](http://www.vatican.va/content/john-paul-ii/en/encyclicals/documents/hf_jp-ii_enc_14091981_laborem-exercens.html)

services and unemployment due to use of technology remains an unresolved issue between Ethics and Economics, the advent of the Internet escalated and made more sophisticated, the Artificial Intelligence (AI). AI is driven by Information and Communication Technology (ICT). It is considered a key tool for the fourth Industrial Revolution and the so-called digital future.

Loosely speaking, AI is the technology that seeks to assist man to think. In fact, depending on the context – whether narrow or broad – it is considered to do the *thinking* for humans [World Economic Forum, WEF 2017]. The next section highlights more on AI. However, the future of work is considered in several quarters [see Jarrahi, 2018; International Labour Organization, ILO, 2018; International Bar Association IBA, 2017] to be in precarious situation if machines completely replace the cognitive and emotional functions and responses of humans. An important question remains: How is the technology to be propagated to students to allay their fears in terms of Ethics (the morality of using AI) and Economics (the material and psychosocial benefits accruable to deploying AI technology and techniques)?

Students of developed countries are presumably familiar with the threats of AI on their prospective jobs. Most of the AI threats are in the cyber space. AI has been used to hack into the electoral processes of some developed countries e.g. in the US. A study by Gherhes and Obrad (2018) indicates that students have expressed fears of cyber-terrorism borne out of AI. Typical examples include the use of malwares to steal personal information and mass data. This collected information are feared to be used for social manipulation, theft and even bullying online.

Moreover, a more practical threat is the threat of unemployment. Such threat comprises the use of robots to replace human labour. For instance, robots have been deployed to serve customers in restaurants, to take care of the elderly, to clean the environment and to drive cars [McKinsey Global Institute, MGI 2017a]. Nonetheless, there are no evidences that suggest that students in the Global North are significantly threatened by AI; rather, they hone their skills to develop and evolve the AI subsector further [Centre for Social Justice, CSJ 2019]. AI complements their labour supply. In fact, it is arguable that the rate of unemployment is relatively low in the developed countries and AI is unlikely to pose a threat to livelihoods [McKinsey Global Institute MGI 2017b]. This perception is reinforced by the number of people who seek immigration and employment to developed countries from developing countries while governments of developing economies solicit the skills of foreign experts who deploy Automotive Technology, AT and AI. Thus, it is

surmisable that diffusion of AI technologies to developing countries causes unemployment in these countries, immigrants from the latter seek employment in the former. For the developing countries in Africa, the argument that its large population is an advantage is becoming unpopular among academics and policy makers [World Economic Forum, WEF 2017]. The high level of uneducated and/or poorly educated labour force is not considered adequate as resource source. Thus, there is shortage of skilled labour. This skills gap is likely to be (or is being) replaced by foreign labour, armed with sophisticated technology which includes artificial intelligence.

Despite perceived evidence of the threat of technology on the future supply of human labour, what is not certain is the extent to which Nigerian students – a significant future contributor to global labour supply – are aware of the likely threat of AI and AT to their lives and livelihoods, and what is being done to forestall, if not alleviate any fallouts in the future. Research [see McKinsey Global Institute MGI 2017a, International Finance Corporation, IFC 2019, and World Economic Forum, WEF 2019] has also shown that AI will affect different cadres of people according to their levels of skills. The skillset needed in future will also depend on the sector the student may likely find him/herself; for instance, Mckinsey Global Institute, MGI (2017a) finds out that routine jobs will easily be replaced by technology but jobs that need negotiations and person-to-person contact will not be easily replaced. Thus, the extent to which graduates are prepared to complement their skillset with AI and AT rather than compete with them will be crucial to coping with future threat on their employment and employability. Literature is however scanty on the disposition of fresh graduates' perception of AI either as competition or complement to their future careers. Gherhes and Obrad (2018) is one related publication that assessed students' perception of AI. As indicated earlier, they find that in Romania, over 80% of the students were very familiar with AI. And almost 60% believed that AI will influence the society positively. The study did not, however, reveal their perception as per their job security in future.

This study therefore assesses recent graduates' awareness and hence preparedness for prospects, issues and possible challenges technology may pose in their future work life. To this effect, the study will:

- 1) Assess students' perception of the level of threat technology will likely pose to their future supply of labour
- 2) Assess their level of preparedness as per how they intend to use technology in future.

## 2.0. Artificial Intelligence: Evolution, Adoption and Implications for Labor Productivity

There are no standard definitions of Artificial Intelligence (AI). According to Gaus and Hoxtell (2019), it has been wrongly used interchangeably with ‘Automation’. But according to Access Partnership, AP (2019), the terms may be used interchangeably. What seems to remain a consensus opinion is the idea that AI is technology that enables machines and devices to think as good as, if not better than man. However, Access Partnership AP (2019) defines AI more aptly as:

A “constellation of technologies that enable machines to act with higher levels of intelligence and emulate human capabilities to sense, comprehend, and act. These human capabilities are augmented by the ability to learn from experience and adapt over time. In other words, AI enables machines to sense their environment, think, and in some cases learn, to take action in response to the environment and the circumstances underpinning it. AI systems are finding ever-wider application across enterprises as they grow in sophistication” pg. 4.

AP (2019) also defines automation as that which “ allows systems to be programmed to perform specific repetitive tasks” . And defines AI as that “ designed to seek patterns, learn from experiences, and make appropriate decisions —it does not require an explicit programmed path to determine how it will respond to the situations it encounters”. He summarizes aptly that “ Automated machines collate data; AI systems ‘ understand’ it” . And that “ AI complements and accelerates automation”. Since AI is considered the 4<sup>th</sup> Industrial Revolution motivated by Information and Communication Technology (ICT) and driven by Data Sciences and Machine Learning, it is useful for the study to use interchangeably AI and Automation or Automotive Technology (AT)

### *Evolution of AI<sup>2</sup>*

AI has come a long way since the mid-20<sup>th</sup> century. It began first by the development of artificial neurons by McCulloch and Pitts in 1943. This development was extended by Minsky and Edmonds in 1956 when they built the first neural network computers. In the same year it was formalized and extended by John McCarthy who organized a two-month conference in Dartmouth on neural works

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<sup>2</sup> This treatise on Evolution of AI was mainly got from Danyluk on the following link <http://slideplayer.com/slide/17536762/>

and intelligence. It was in this conference that a new name and a new field of study was designated as “ artificial intelligence” .

Since then AI evolved with much work on neural network. Between 1956 and 1969, a few games were developed: Arthur Samuel’ s checkers player and Shakey the robot. Advancement and development of neural networks also posed new realities to the development of computers.

In the 1970s, articulation of neural networks to function in computers made their operationability cumbersome. Early computers were too big and complex – they were slow, expensive and with little memory. In this period, artificial intelligence (via sophistication of neural networks) couldn’ t be proliferated by the computers and it was difficult to evolve a knowledge-based system or an Expert System.

The late 1970s and the 1980s ushered in the advent of microminiaturization of operating systems of computers. Leading firms in this regard were Microsoft (led by Bill Gates), Apple (led by Steve Jobs) and Tesla (led by Elon Musk) [Centre for Social Justice, CSJ 2019]. With proliferation of microcomputers birthed the Expert Systems<sup>3</sup> dominated by neural networking and hence the motivation and propagation of artificial intelligence.

From the 1990s (the latter part of 20<sup>th</sup> century) until date, there has been a proliferation of computers and expert systems – computer-based systems. Computers now are cheaper, faster with by far with higher memories than their earlier counterpart. High-speed processors in computers enhanced the abilities for expert systems to become more “ artificially intelligent” . Computers have, by implication, begun to engage in some apparently difficult tasks. For instance, the computer using AI beat Gary Kasparov in chess [Centre for Social Justice, CSJ 2019]. Computerized expert systems have enabled exploring other planets without humans. Robots also have been used in the field of entertainment, in service provisioning – in serving meals in the restaurants, in vacuum cleaning to mention a few.

### ***Adoption of AI***

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<sup>3</sup> Expert Systems are machines that are “experts”, that is, machines that are designed for automation “ to essentially do thinking like man. They use Inference Engines to deduce facts and induce them. Machine Learning and Data Sciences are key drivers of these technologies. For instance (a set of) machines that are used in the cargo and freight industries to clear goods and match them to their owners. Others are automated systems that diagnose faults in telephony.

Globalization has necessitated the increased likelihood, if not certain, adoption of artificial intelligence sooner or later. AI works together with principles from other fields of study e.g. ICT, Machine Learning and Data Sciences. Tools and techniques in these fields will enhance development and adoption of AI. AI students and practitioners must master these techniques and tools. What is unclear however, is the extent expertise in these techniques have motivated adoption of AI. According to McKinsey Global Institute, MGI [2017a], there are five factors that influence adoption of AI. They include technical feasibility; cost of developing and deploying solutions; labor market dynamics; economic benefits; and regulatory and social acceptance.

Broadly speaking, however, adoption rate is categorized into two: earliest adoption and late adoption. The former and the latter account for 20% and 80% respectively. In general, it will take decades, if not centuries, for adoption to take place in full [Gaus and Hoxtell, 2019]. McKinsey Global Institute, MGI (2017b) notes from their findings that current AI and AT innovations will take until 2055 to be fully adopted. In this regard, the laggard adopters of AI will be developing countries.

In spite of the rapid emergence and adoption of AI, an important question for this study is: What is the rate of adoption especially in developing countries in Africa?

### ***Implications for labor productivity and students' perception***

There are growing indications that AI and AT have come to stay and are tools of globalization. This is because the benefits – efficiencies and productivity – accruable to deploying the technologies in one part of the world will be adopted and/or improved on by users and producers in other parts. In the least, AI will either complement human labour or substitute or supplant human labour and even inter-personal relationships<sup>4</sup>. In this case, AI engages with humans beyond routine motor tasks but on cognitive and affective (emotional) levels. What has been unclear is the extent machines may take up such emotive and cognitive tasks – how they would make judgments as good as humans. This includes the extent machines can counsel and coach, mentor and motivate humans to productivity. What is also unclear is the difference in students' perception of AI and its bearing role on their careers in developed and developing countries.

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<sup>4</sup> Recent developments in China and elsewhere is the use of Chatbots. These are features that provide emotional support to lonely individuals. The devices gauge the psychological or emotional status of individuals and respond accordingly

Students therefore will make career choices based on the information on AI and AT available to them, for instance, their knowledge of how high skilled, middle skilled and low skilled their careers options are. McKinsey Global Institute, MGI (2017b) summarizes workers with these skillsets as follows:

- High-skill workers who work closely with technology will likely be in strong demand and may be able to take advantage of new opportunities for independent work as the corporate landscape shifts and project work is outsourced by companies.
- Middle-skill workers whose activities have the highest technical potential for automation (predictable physical activities, collecting and analyzing data) can seek opportunities for retraining to prepare for shifts in their activities toward those that are complements of activities the machines will start to perform.
- Low-skill workers working with technology will be able to achieve more in terms of output and productivity but may experience wage pressure given the potentially large supply of similarly low-skill workers.

In developing countries, the skilled workers are expected to be fewer and low-skilled workers will be higher [World Economic Forum, WEF, 2017]. This is because of the differences in governance and hence provision of infrastructure for health and education. However, despite the differences in quality of educational systems in the developed and developing countries, the internet has apparently reduced information asymmetry between students in both worlds. In this instance, it is easier to access career information online than several years ago. Most of the students in the developing countries have Facebook and other social media accounts. It is unclear, however, the extent they seek career-useful information and the extent AI may be useful to them. Nonetheless, it is plausible to claim that students in the developing countries may have knowledge of the tools and techniques needed for their career but may not have access to the infrastructure needed to activate them, as do their counterparts in the developed countries.

### **3.0. Methodology**

#### ***Population and Sampling***

The population of the study was recent graduates from tertiary schools in Nigeria during the 2019/20 academic session. These graduates are mandated to enlist in the National Youth Service

Corps (NYSC)<sup>5</sup> scheme. About 400,000 graduates enlist in the program annually across Nigeria. These graduates are distributed to each State and each Local Government Areas (LGAs). The graduates are deployed essentially to rural areas to implement services that will help develop communities. Further, the Scheme is intended to familiarize graduates to parts of the country they were unfamiliar with.

### ***Sampling***

About 2,000 corps members were posted to Enugu state. These Graduates were randomly assigned to each of the 17 LGA and purposely deployed to firms and workplaces where they would render professional services. Of the 2000 corps members posted to Enugu State, 128 of them were posted to Enugu East LGA which was the study area. From the 128 copies of the questionnaire distributed, a total of 112 questionnaires were retrieved successfully.

### ***Data Collection and Variable Description***

Primary data was collected from the respondents through structured questionnaires. The corps members were briefed on objectives of the research. The working definition of AI was also explained to them to enable them to fill the questionnaires properly.

The questionnaire was subdivided into four Sections: the first section focused on respondents' socioeconomic characteristics – age, gender, course studied in the university, and parents' education. Section 2 focused on their knowledge of AI – if they have ever heard or worked with AI. Section 3 aimed to explore their perception of threat of AI to their future careers while the last Section elicited responses on how apparently prepared they were against any perceived threats of AI in future. See sample of the questionnaire in the Appendix Section.

***Table 1: Summary Statistics and Description of Variables***

#	Variable	Descriptions	obs	Mean	Std. Dev.	Min	Max
1	futjob	Preferred sector to work in	112	2.125	0.772559	1	3
2	ivreadyai	Readiness to work with AI	112	1.741	0.440015	1	2
3	intendai	Willingness to pay for AI training	86	18953.5	54327.52	1	3
4	policy	Knowledge of any government policy on AI/ICT	112	1.901	0.298942	1	2
5	Iiai	ever heard of AI	112	1.357	0.481311	1	2

<sup>5</sup> The NYSC scheme was established in 1973 as part of the post-civil war measures to foster regional and tribal integration. Graduates are posted to other parts of the country where they were unfamiliar with to deploy their newly acquired skillsets.



6	iiiknowai	lack of AI knowledge will make you unemployable in future	112	1.973	0.787971	1	3
7	losjobai	lack of AI knowledge will make you lose your job in future	112	2.053	0.733243	1	3
8	class	graduating class of degree	112	2.312	0.723247	1	6
9	futjobai	whether future job will be driven and dominated by AI in 10 years	112	2	0.859499	1	3

### Methods of Data Analyses

Simple Descriptive Statistics – Tables and Charts were used to describe profile of students according to the knowledge of technology they anticipate in future or that currently exists, to assess students' perception on the level of threat of these technologies, appraise their knowledge of access to these technologies, and level of preparedness to use these technologies in future

Multinomial Logit Model was estimated to describe determinants of awareness and preparedness to adopt these technologies among the students. It is estimated when there are multiple options as dependent variables Greene [2006]. Thus, the probability of an event occurring is

$$P_i = P(Y_i = j | x_i) = \frac{e^{w_j x_i}}{\sum_{j=1}^3 e^{w_j x_i}}$$

The model is specified as  $P(Y_i = j | x_i)$   $j = 1, 2, 3$ . And  $x_i$  is a vector of independent variables. The dependent variables  $j$  indicates a recent graduates' perception of AI as threat to their future careers. Respondents' responses (perception or opinion) as "AI will make people lose jobs in all sectors", "AI will make people lose jobs in some sectors" and AI is not threat to future jobs are  $j = 1, j = 2$ , and  $j = 3$  respectively. The base outcome is the one of the vectors of dependent variables that is used as the basis for comparing the motivation to teach students. Thus the base reference,  $j = 3$ , is chosen as the base outcome. The series of dependent variables is regressed against the selected independent variables – [list them; describe them  $x_i$  are  $x_1 =$  Iai is ever heard of ai,  $x_2 =$  Iiiknowai is lack of AI knowledge will make you unemployable in future,  $x_3 =$  Losjobai is lack of AI knowledge will make you lose your job in future,  $x_4 =$  Class is graduating class of degree,  $x_5 =$  Futjob is whether future job will be driven and dominated by AI in 10 years. Thus, the model estimated the factors that may influence graduates' fear of AI on their future careers.

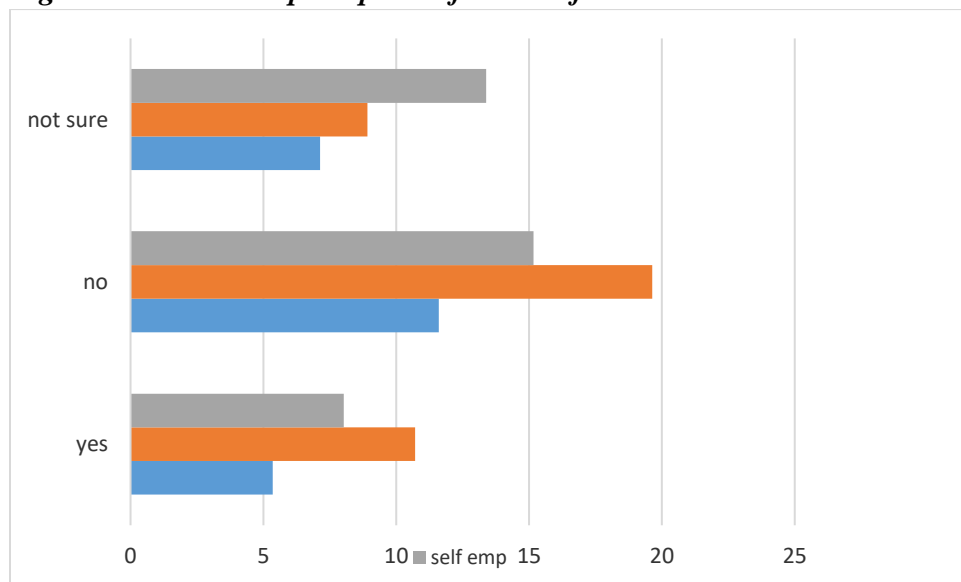
#### 4.0. Results

The results of this study are described in two aspects. First is through descriptive statistics – the clustered charts – that describes graduates’ perception of threat of AI to their future livelihoods. Then multinomial regression analyses describe factors that influence the perceptions.

*Students’ perception of threats of AI to their careers according to their preferred labour choice in 10 years*

Figure 1 shows the distribution of students according to their perception of threat of AI given the sectors of the economy they wish to work in the nearest future. About 47% of the graduates do not perceive AI will threaten their individual careers in the next 10 years. This set of graduates constitute about 20%, 15% and 12% of the entire students that wish to work in organized private sector, as self-employed, and in the public/civil service respectively. By the same comparison, students who believe AI will threaten their jobs in future are 8%, 11% and 5% respectively; and those not sure if AI will pose a future threat is 13% 9% and 7%.

**Figure 1: Students’ perception of threat of AI**

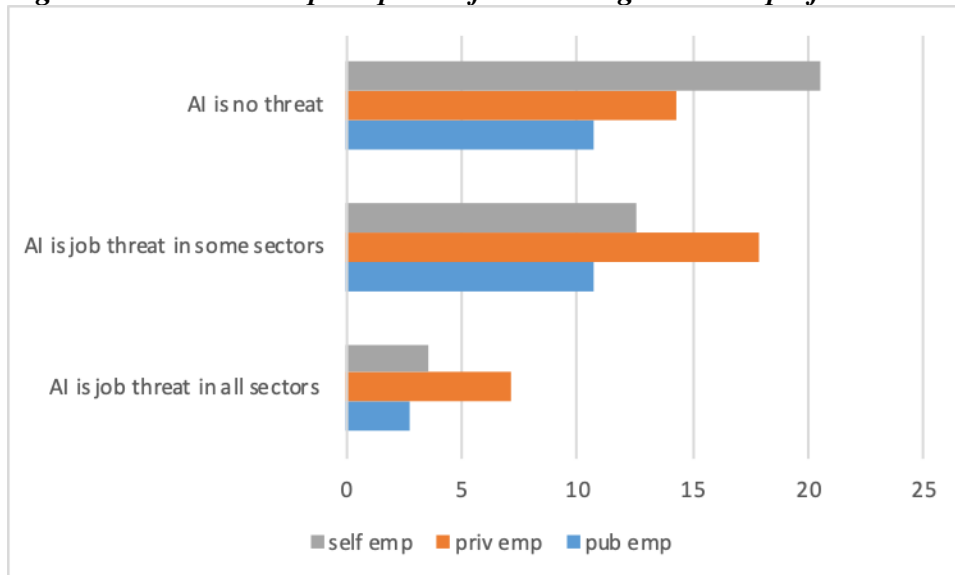


*Graduates’ perception of AI threat to jobs in sectors of the economy*

Figure 2 describes graduates’ perception of threat of AI to the various labour subsectors in the next 10 years. About 41% of the respondents believe AI will threaten jobs in some sectors of the

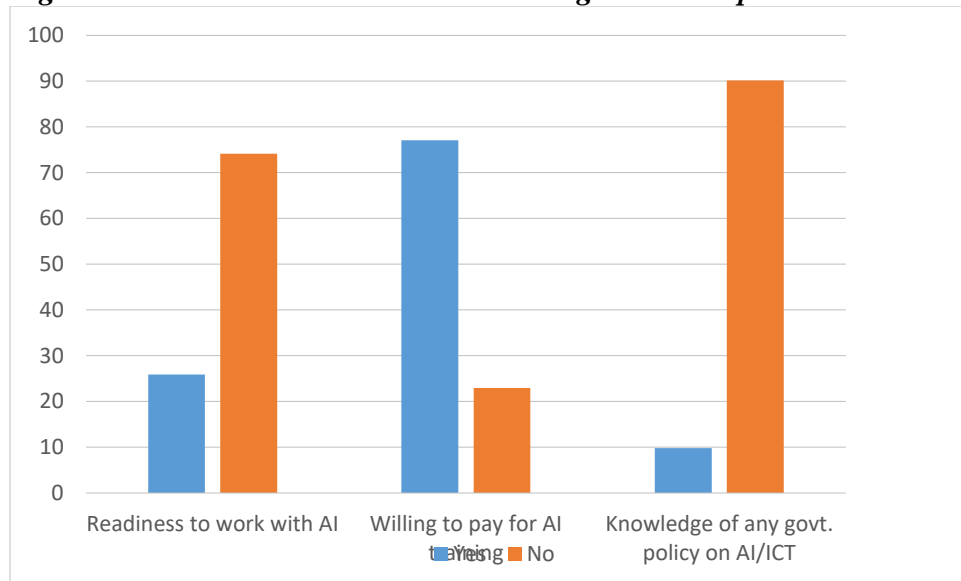
economy; 13% believe AI will threaten jobs in all sectors and 45% believe AI will not threaten any jobs. In a disaggregated sense, about 21% entire students who intend to be self-employed do not believe AI will threaten jobs in any sector of labour. Graduates (about 19%) who intend to work in organized private sector – for example the multinational companies – perceive AI to be a threat to some sectors but not in others. These same categories of graduates (about 7%) believe AI will threaten employment of labour in all labour subsectors. Graduates who prefer to work in the public sectors have the least distributions in terms of opinion on AI. They constitute about 11% who perceive AI will be of no threat. The same percentage of graduates believes AI will be of partial threat and about 2% perceive AI is a threat to all sectors.

**Figure 1: Graduates' perception of AI threat given their preferred labor sector**



#### *Graduates' willingness to adopt AI*

The graduates (74%) overwhelmingly revealed their unreadiness to work with AI now and in the nearest future. Also, about 77% of the students indicated willingness to pay for AI training as a response to their lack of AI knowledge to this effect. Almost all the respondents (90%) are not aware of any government policies on AI or ICT and related technologies. See Figure 4.

**Figure 2: Graduates' readiness and willingness to adopt AI**

### *Determinants of graduates' perception to AI threat*

Table 3 shows determinants of graduates' perception to AI threat. That is, the characteristics of graduates that influence their perception of and disposition to (possible) AI threat to their careers in future. All the variables show negative directionality, meaning that a decrease in magnitude of the independent variables will increase their perception of the threat of AI in the next 10 years. The students' opinions on whether AI is likely to threaten their jobs in all sectors of the economy or in some sectors is premised on their opinion that AI is no threat to jobs in all sectors.

However, results show that students who have never or rarely heard of AI are more likely to perceive AI as threat to employment in all sectors of the economy. Some of them are also more likely to believe that AI will threaten jobs in some sectors rather than not threaten all.

Some respondents also believed that their current lack of AI knowledge may make them unemployable in future. Significant proportion of them believed that AI will threaten their jobs irrespective of their chosen careers; some others in this category believed that AI will only threaten their jobs only if they choose careers in some sectors but not others.

Finally, graduates with lower class of degree i.e. scoring lower than a first-class degree perceived that AI will cause them job loss in all sectors over those who do not believe AI threat. Also, some graduates in this cohort believe AI will not threaten jobs in some sector but in others.

**Table 1: Factors that influence perception of AI threat to employment**

IVs	DV: Perception of AI threat in the next 10 years			
	1 vs 3		2 vs 3	
	Coefficient	Std. error	Coefficient	Std. error
<b>Iiai</b>	-3.02**	1.25	-1.82***	0.62
<b>Iiknowai</b>	-2.01***	0.77	-0.98**	0.46
<b>Losjobai</b>	-1.98***	0.75	-1.57***	0.54
<b>Class</b>	-1.18**	0.53	-1.10***	0.41
<b>Futjob</b>	-0.42	0.52	-0.31	0.36
<b>Constant</b>	13.80***	3.19	10.95***	2.34

**NB: 1 = AI will make people lose jobs in all sectors; 2 = AI will make people lose jobs in some sectors**

**3 = AI is not threat to future jobs**

Obs = 112

LR Chi Square (10) = 74.48

Prob. > Chi Square = 0.000

Psuedo R<sup>2</sup> = 0.3349

## 5.0. Discussion

Nearly half of the graduates do not believe that AI will threaten their jobs in future, at least in the next 10 years; and about 20% believe that it will. This shows that they are vulnerable to AI threat. Their vulnerability is essentially due to their ignorance of the realities and threat of AI. Another implication is that the graduates still believe in the traditional (low- or no tech) approach of doing business. This may be unsurprising because most students are not exposed to infrastructure that will drive AI. For instance, the cost of doing business in Nigeria is one of the highest in the world [World Bank, 2020a]. Few students have access to steady supply of electricity and access to the Internet. Most of the students will likely engage in low-tech (or none at all) ventures [MGI 2017b]. Most of the skilled, endowed and AI-aware graduates usually prefer to get western postgraduate education to develop and utilize their talents. Extending graduates' perception of AI a bit further afield to the economy, about 45% of the respondents did not believe AI will be a threat to any sector of the economy, while about 40% believe that AI will threaten some sectors. From the foregoing, few of the graduates consider AI as a threat to their source of livelihoods or to the economy in future.

Access Partners AP (2019) explains that automation will vary across sectors. Some sectors will be more routine than others. But the context of sector is economic – whether in the agriculture, mining, transportation, health, education, etc. Literature is however unclear on the sector or aspect

of labour that is lucrative or secure for deployment of AI – whether in the public, organized public sector or in self-employment. In Nigeria and in many other developing countries, graduates choose their careers based on job security. In Nigeria, the most secure jobs are in the public sectors and in the organized private sector like the Oil companies and other multinational companies. However, many literature [see Gatune and de Boer, 2019; Access Partners AP 2019] suggest that the private sector pretest and deploy AI technologies as innovators while policy makers will drive the process by creating enabling environment for the private sector. Successful testing of AI may necessitate its deployment in the public service. However, since public service and political appointments are the most secure and lucrative employments in Nigeria, many youths desire to gain employments in these areas. The private sector is nonetheless emerging as the highest employers of labour and adoption of AI by graduates is likely higher here.

Most of the graduates (almost 80%) revealed they were unprepared to work with AI inasmuch as they were willing to pay to learn to work with it. Almost all of them were unaware of any policies or laws that governed introduction and adoption of AI in Nigeria. This implies that there is a deficiency in curriculum – inability to reflect the global technological trend. Moreover, this deficient curriculum reflects the ‘ disconnect’ between the policies of the government on AI and the educational system despite the availability of the Internet. The result further implies that despite the information on AI available online, the graduates by default have not been stimulated to explore the opportunities and challenges of AI on their own. Since most of the former undergraduates were not aware of the opportunities and challenges of AI and the extent it could threaten their jobs, the graduates are therefore likely to seek jobs they perceive will not involve AI. On the other hand, their labour supply in future will likely be supplanted or substituted by AI or AT. To this effect, the graduates are indeed likely to be threatened by AI.

The foregoing scenario agrees with literature that Nigeria is one of the worst countries in terms of mastery of content and completion of curriculum (see WEF, 2017). The country has been ranked very low in terms of overall educational quality and achievements [CSAE, 2019; WENR, 2017]. However, since the graduates are willing to pay for AI training. Their vulnerability to labour loss to AI will likely reduce. The extent of their willingness to pay and how much they are willing to pay is unclear. This is because the low involvement of policy makers in terms of subsidizing or creating incentives for learning AI is low and bleak.

## **6.0. Conclusion**

This study contributes to extant literature by exploring the perception of recent graduates to the threat of AI to their future employment in at least 10 years. The results indicate that most of the graduates did not consider AI a possible threat to their future employment, although some believed it may threaten some sectors and not others. Thus, they ‘thought’ that AI may affect the wider society but not them directly. Nonetheless, graduates with higher class of degree perceive AI as a threat to their careers and many are willing to pay to learn AI. Nigeria is crucial for this study because the country is the most populous black nation. As the study has demonstrated, Nigeria suffers huge infrastructure deficit and the graduates possess little information or awareness of AI; this suggests that the country may not be ready for the impact of AI on its labor force and productivity. This study is however limited by not showing more results that relate socioeconomic and demographic characteristics of respondents to their perception of AI as threat to their future employment. This would have helped disaggregate respondents according to their disposition to AI. Peculiarities of respondents may be useful for policy targeting, that is, to identify graduates according to the relevance of their fields of study and keen disposition to AI for training and retraining.

Another remarkable outcome is that majority of the graduates are unaware of any government policies and laws on AI and ICT. This implies the wide gap between policy and practice in Nigeria’s education system. Nigeria has been known for poor educational system performances despite her huge potentials to lead in ICT and other spheres of knowledge<sup>6</sup>. Many of the policy makers and politicians send their children to foreign schools rather than enforce implementation of functional contemporary policies.

Although, the sample size of the respondents is limited for generalization, the study suggests that AI may be alien to recent graduates in Nigeria. Their ignorance is reinforced by poor policy and academic environment. Nigeria is ranked as the one of the worst countries in Africa in terms of completion and mastery of curriculum. The World Bank (2020b) says she has the highest number of poor people in the world despite her wealth of human and natural resources. Since the politicians

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<sup>6</sup> It is common knowledge that Nigeria has produced scholars of international repute. This is often because many of them school in the West where productivity and motivation to succeed is high

and policy makers are the key drivers of AI and AT, the foregoing suggests they lack the will to build critical infrastructure in Nigeria<sup>7</sup>.

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<sup>7</sup> It is on this basis among others that Nigeria is adjudged one of the most corrupt countries in the world according to Transparency International



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## Appendix

### Artificial Intelligence and Future of Work: Recent Graduates' Perspectives in Nigeria

Dear youths,

The questionnaire is to assess the level of awareness of the influence of Artificial Intelligence (AI) on the likely productivity of youths. Please **fill the empty spaces/cells** and **tick or circle** correct the numbers for the options provided. Thanks.

#### **What is Artificial Intelligence?**

Artificial intelligence, AI, (sometimes called machine intelligence) is the intelligence demonstrated by machines (devices). These machines are programmed to think like and act even smarter, more accurately and more efficiently than humans. The machines (computers) are programmed to mimic the thought process of the human mind and hence are used to learn and/or solve problems related to intelligence. For instance AI is used for the following: autonomous planning and scheduling of tasks aboard a spacecraft, beating Gary Kasparov in a chess match, steering a driver-less car, understanding language, robotic assistance in surgery, military and business simulations and modelling, monitoring trade in the stock market to see if insider trading is going on. It is also related to data analyses and computer programming.

<b>I</b>	<b>Section A: Socioeconomic Characteristics</b>	
<b>#</b>	<b>Questions</b>	<b>Responses</b>
1	Age	
2	Gender	1 = Male, 2 = Female
3	Course studied in the University	
4	Schools attended	1 = Public University, 2 = Private University, 3 = Public Polytechnic, 4 = Private Polytechnic
5	Graduating Class of Degree	1 = 1 <sup>st</sup> Class, 2 = Second Class Upper, 3 = Second Class Lower, 4 = Third Class, 5 = Pass, 6 = Others
6	Desired future job or employment	

7	Mothers' highest level of education	1 = primary school, 2 = secondary schools, 3 = OND/NCE, 4 = BSc/HND, 5 = MSc, 6 = PhD
8	Father's highest level of education	1 = primary school, 2 = secondary schools, 3 = OND/NCE, 4 = BSc/HND, 5 = MSc, 6 = PhD
<b>II Section B: Knowledge of AI</b>		
9	Have you heard of AI before?	1 = Yes, 2 = No
10	Have you used AI before?	1 = Yes, 2 = No
11	Have you ever attended AI training?	1 = Yes, 2 = No
12	Do you think your <b>desired future job</b> will be driven or dominated by AI in the next 10 years?	1 = Yes, 2 = No, 3 = I don't know
13	Are you aware of any AI software that is being used in your field of study?	1 = Yes, 2 = No, 3 = I don't know
14	What is the name of the technology?	
15	State how AI is currently used in your future field of endeavor	
16	How did you know about these technologies?	1 = Radio, 2 = TV, 3 = Internet, 4 = Teachers/Lecturers, 5 = Peers/Colleagues
<b>III Perceived Future Threat of AI</b>		
17	Do you think lack of knowledge of AI will make you unemployable in future?	1 = Yes, 2 = No, 3 = I don't know
18	Do you think lack of knowledge of AI will make you lose your job in future?	1 = Yes, 2 = No, 3 = I don't know
19	Which of the following do you think is feasible with AI in the next 10 years?	1 = AI will make people lose their jobs across all sectors of the economy, 2 = AI will make people lose jobs in some sectors of the economy, 3 = AI will not threaten people's jobs
<b>IV Level of Preparedness to Use AI</b>		
20	Are you ready (knowledgeable enough) to use AI to work today?	1 = Yes, 2 = No
21	If <b>Yes</b> to <b>Q20</b> above, how do you prepare to use these technologies?	
22	How much did you pay to learn AI?	

23	If <b>No</b> to <b>Q20</b> , do you intend to learn AI technologies?	
24	How do you intend to learn?	1 = local training, 2 = online training, 3 = get trained abroad
25	How much are you willing to pay to learn AI?	
26	Are you aware of any government policies or programs to promote the learning and use of AI?	1 = Yes, 2 = No
27	What is the name of the Document or the website to find it	