



AI AND THE EVOLUTION OF ACCOUNTING PRACTICES IN NIGERIA: A CRITICAL ANALYSIS

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Abstract: Artificial intelligence with its fifth industrial revolution is fast gripping the African continent. The emergence and adoption of artificial intelligence applications and systems is fast becoming a normal trend in emerging markets landscape across Africa. This paper is borne out of the need to identify challenges that professional grapple with in their quest to surmount the challenges posed by the realities of artificial intelligence applications in Africa. The study adopted the thematic style in presenting the challenges as well as the prospects of artificial intelligence applications for the accounting professional in emerging market. Some of the challenges of artificial intelligence application identified in this study include: complex algorithms, reduced investment, and software failure, lack of political will and limitations amongst others. On the other hand, opportunities of artificial intelligence in emerging market include transportation automation, technological cyborgs and robotic companions amongst others. From the findings, accounting professional are advised to strive harder in order to beat competition by delivering quality services to her clients through harnessing opportunities for rebranding, reengineering and radically improving the business and investment decisions which is the ultimate purpose of the profession. More so, they are encouraged to develop a novel set of proficiency revolving around data in the profession

Keywords: Artificial intelligence; Challenges; Opportunities; Accounting Profession; Fifth Industrial Revolution

Introduction

In the past decade, artificial intelligence (AI) has transformed business and society to unimaginable heights (Bakovic, Biallasm, Conde, Cook ...et al, 2020). With its enormous potentials, artificial intelligence provides huge promise in augmenting human intelligence with ways that radically changes consumers access to products, services and information (Choung, David and Ross, 2022; Ogunleye, 2021). Aside its offer of lower cost opportunities, AI removes barriers of entry for new businesses making it very attractive for start-ups businesses in emerging markets to grow and thrive. In emerging markets such as most markets in Africa (Nigeria being one of these), the issue of poverty alleviation, job employment and boasting of shared prosperity provides Ai the opportunistic springboard for economic development. According to Bakovic et al. (2020), artificial intelligence has the power to significantly improve human intelligence and change how we communicate, access goods and

services, gather data, and produce goods. Marr (2022) predicts that in 2023, AI would be more embedded in peoples' everyday lives with the recent democratization of artificial intelligence which makes artificial intelligence functionality to be accessible to all irrespective of one's knowledge or technical skill. Although, AI based solutions are being applied on pressing developmental challenges in most emerging markets, there is a need to scale up new business models and develop a new means of providing services, while boosting competitiveness of local markets. According to Strusani and Hounghonon (2020), each of these solutions needs creative methods to increase potential and reduce risks related to this new technology.

The idea of "human made being" with an artificially created intelligence was first created by Hephaestus in Greek Mythology depiction. Human are members of a species whose revolutionary success relied heavily on the ability to use tools intelligently to survive. Human behavior interacts with nature and the environment to the point where random mutations for increased intelligence are naturally selected, and this is how human intelligence is represented. According to the theory, mutations that allowed our ancestors to influence others' perceptions of themselves and their environment led to the development of complex abstract thought in humans (Kumar, 2018) cited in (Robinson, 2018). It was a Dartmouth math professor John Mc Carthy who first coined the word artificial intelligence in 1955. Due to the lack of advanced computer technology, artificial intelligence was practically useless and regarded as a fringe to technology for decade until the beginning of 21st century which ushered in the dot.com phenomenon.

A global independent survey conducted by Ann and Northstar in 2017 shows that 61% of consumers believe that AI will make society better or much better, while 22% believe it will make society worse. These figures indicate a positive – leaning perceptions. Another study by (PWC, 2017) reports that 63% of people agree that AI will help solve complex problems while 46% of people believe AI will harm people by taking away jobs. The offside of this report is that 63% of consumers globally are not aware that they are already using AI technologies (Hutson, 2017). The current global world estimate for AI as identified in 2016 by Statista; a market research firm estimates that market size for AI will be \$6.1billion; IDC estimates spending on AI to hit \$47bn while Tractica estimates similar figure for on or before the year 2024. Annual worldwide AI revenue will grow from \$643.7m in 2016 to \$86.8bn by 2025. Price Waterhouse Coopers estimate AI deployment will add \$15.7tn to global GDP by 2030 (Dutt, 2018). Although a core driver for economic development by most analysts, AI potential growth can be seen on it impact in a range of businesses. In 2017 (MGI: Mc Kinsey Global Institute) estimates that by 2025 automating knowledge work with AI will generate between \$5.2tn and \$6.77. Advanced websites with its' reliance on AI will generate between \$1.7 and 4.5trn; autonomous and semi-autonomous vehicle will generate between \$0.2 and \$1.9tn

In developed markets, AI is fast making waves but in Nigeria, acceptance of artificial intelligence is still at the "formative years" level (Ogunleye, 2021). Some of the growing artificial intelligence startups in Nigeria include:

- i. Kudi AI: who specializes in providing an AI-enabled chatbot to aid in the conveying of remittances to relatives in Nigeria.
- ii. Data Science Nigeria: an institution whose priority is to provide research which can be changed into business applications. It specializes in performing artificial intelligence and machine learning boot camps and competition respectively.
- iii. AirSmat: this artificial intelligence enabled software that is used for the management of drones in Nigeria
- iv. Robotics and Artificial Intelligence Nigeria: training for artificial intelligence, machine learning and robotics is offered by this artificial intelligence start-up.

The Federal government of Nigeria having realized the huge potential that artificial intelligence provides as a new frontier for economic opportunity and social development in Nigeria went on to establish a Center for Artificial

Intelligence and Robotics focused on networking, research development, and information and communication security. Perhaps, this would encourage the rapid adoption of artificial intelligence applications across professions. It is the objective of this paper to identify the challenges and opportunities posed by artificial intelligence applications to professional in Nigeria especially the accounting professionals.

The Concept of Artificial Intelligence Application in Nigeria

Intelligence is defined as the “ability to achieve one’s goal in life, within one’s socio-cultural context” (Sternberg, 1984). On his own part, (Gardiner 1999) perceives intelligence as a “biopsychological potential to process information, to solve problems....” Schlinger (2003) sees intelligence “as skills that humans learn overtime to adapt to their environment”. Human intelligence is therefore, “the ability to learn from experience and adapt to the environment” (Gardiner, 1983; Sternberg 1984). The types of intelligence arranged from simple to complex intelligence include: mechanical, analytical, in intuitive and empathetic intelligence respectively.

Artificial intelligence “encompasses multiple technologies including machine learning (ML), deep learning (DL), computer vision and natural language processing (NLP)”. Artificial intelligence (AI) is “a multi-disciplinary field of research that covers a wide variety of content, technologies and different applications’ involving cognitive science, robotics and natural interfaces” (Borana, 2016; Brill, 2018) Artificial intelligence is making advancement towards “embracing the scientific goal of constructing an information- processing theory of intelligence” (Nilsson, 2014:2); “a collection of technologies which sense, learn and act” (Stone et al, 2016); tailored to “mirror or mimic” and possibly outperform human beings (Borana, 2016).

The advent of artificial intelligence into the business world of today has necessitated drastic changes to the fundamental ways in which customers and companies interact with each other (Brill et al, 2019). Often referred to as “disruptive change agents” (Kumar, et al, 2016) artificial intelligence applications have challenges well established marketing processes, procedures and strategies (Brill, 2018). For firms to beat this challenge, Grewal, Roggeveen and Nordfalt (2017) suggest a proper knowledge and understanding of customer preferences as well as managing customer experience at engagement levels. Importantly, one of these levels being the acceptance stage of a new technology (Venkatesh and Goyal, 2010).

The artificial intelligence applications that are relevant to business of today include:

1. Machine learning (ML)

Machine learning is a subset of artificial intelligence. It serves as the technical basis for solving problems, uncovering insights or producing a behavior (Wittten, Frank, Hall and Pal, 2016). Machine learning is achieved through the analysis of a large set of structured data (that is, traditional machine learning) and unstructured data (that is deep learning) to find useful information”; “information that is important for predicting, explaining and understanding a phenomenon” (Witten et al, 2016). The “goal of machine learning is to develop cognitive learning algorithms that can be programmed to solve new problems using applied learning from previous examples rather than directly programming algorithms to solve new problems as they arise’ (Najafabadi et al, 2015). Nowadays businesses make use of machine learning “approaches to gain a competitive advantage, generate revenue, as well as deliver intelligent product that are more personalized, efficient and adaptive” (Alpaydin, 2014). A major component within the growth of AI technologies business to industry 4.0 is machine learning (Zawadaki and Zymicke, 2016). In marketing, machine learning gives the firm insight on how to refocus the firm’s resource towards providing personalized offer to customer needs. It also enables the organization to do research on the customers in order to understand the demographics as well as purchase patterns of these customers (Davenport and Kim, 2013). Insight can be extracted from analytical “advancements in the areas of visual objects recognition, sentiment analysis, question answering and speech recognition” (LeCun, Banjio and Hinton, 2015; Brill, 2018).

2. Deep learning (DL)

This is a sub category of machine learning that allows for an effective way of unsupervised learning through the use of neural networks. These neural networks are modeled after the human brain and utilize a network of interconnected “neurons” or nodes to analyze data in a non – linear way.

3. Natural language processing (NLP)

Natural learning processing is the “part of the computational linguistics branch of computer science focused on ensuring that computer learn, understand and produce human language content” (Hirschberg and Manning, 2015), NLP “tries to understand speech and text as human beings would do” (Osman and Zalhan, 2016:44). The “activities performed by NLP include correcting of spelling errors, forming semantics, sentence structures, providing semantic relationships for the appropriate response” (Canbek and Mutlu, 2016: Brill, 2018).

In business, NLP is a technology bridge that enables “machine language to ultimately be transformed to human communication and vice versa” (Daris and Marcus, 2015). NLP has made it possible for companies to identify and monitor emerging topics and options. Identifying customers’ needs and tailoring such needs with the demographic information of customers is one of the many functions of NLP in marketing (Hirschberg and Manning, 2015). More so, knowledge gained from NLP would provide a proactive competitive advantage to response to the market “by focusing specific resources and extending personalized (customized) offers to the customer” (Moorthy et al, 2015, Bill, 2018).

4. Chatbots

Chatbots are text – based conversational applications that let a human user talk with a bit that replies immediately to them. A study conducted by SAP (a market research firm) revealed that only 9% of future 500 companies are implementing chatbots (SAP, 2018).

Chatbots are of two forms namely

- *The rule – based chatbots and - The AI – powered chatbots.*

The first which is rule – based chatbots responds only to specific commands. If the user does not input the correct command, the chatbots will not understand and respond accordingly to the prompt. Meanwhile learning, natural language processing, natural language understanding and natural language generation to enable human – like conversation are the features of AI-powered chatbots. This form of chatbots learns from past conversation with user and can assess important information to store for reference in future conversations (Cannella, 2018).

Specifically, in finance artificial intelligence applications relevant to the field include robotic process automation and intelligent automation (Marr, 2022),

Benefits of AI to Accounting profession

a. Productivity and efficiency are two objectives that professionals strive to achieve in their daily routine. Artificial intelligence is capable of improving the accountant productivity and efficiency through the reduction in time needed to accomplish a task. Artificial intelligence applications help accountant to reduce errors in work done while improving on the quality of work rendered to their clients.

b. Currently there are two generations of consumers that are more attune to artificial intelligence than any other generation of consumers. The generation z (born between 1994 and 2004) and millennial (born between 1984 and 1994) are two generations of consumers that are more conformable with online options (Vrechopoulou et al, 2011; Uusitalo, 2012). Due to the fact that these cohorts of consumers developed with technology, they are likely to be impressed by any company who employs artificial intelligence in their service provision to customers. The generation z and millennial professionals have a preference for latest machinery and invention that sustains their working preference of flexibility.

c. Most accounting processes are repetitive in nature. Artificial intelligence application helps to reduce time-consuming tasks for the accountants while giving such accountants ample time to concentrate more on the strategic and advisory part of their jobs. The robotic process automation (RPA) and intelligent automation (IA) applications mimic human interactions and uses historical data to adapt to an activity.

d. A company that wishes to survive in the business place must be proactive. Artificial intelligence application helps in providing real-time status of financial matters which makes daily reporting of financial issues faster, possible and less expensive. It also helps the accountant to take proactive steps in preventing future losses.

e. An automated system in the accounting world is bound to assist the accountant in accounting processes such as expense reports, procurements, accounts payable, purchasing, account receivables, invoicing and more. This will enhance productivity and profits for the organization.

Theoretical Viewpoint

The theoretical rationale for the concept known as artificial intelligence can be found in the theory of anthropomorphism. The National Institute of Health describes anthropomorphism as the tendency to imbue the real or imagined behavior of nonhuman agents with humanlike characteristics, motivations, intentions, or emotions; in this case, ascribing human-like characteristics to machines. In the accounting profession, routine tasks which are the norm are oftentimes tedious and in need of assistance. Artificial intelligence most often provides that needed assistance through its various applications and systems.

Developed from the seminal works of Heider and Simmel in 1944, the theory of anthropomorphism tends to interpret human in terms of simple objects in motion. In other words, man's activities have been interpreted in simple ways that intelligent machines can mimic. Deeply rooted in the theory of mind (ToM), anthropomorphism is defined as ascribing minds to "non-human entities". The theory of the mind is defined as the process of taking the perspectives of another person. The aim of anthropomorphism is to help create vibrant and ingenious characters that are relatable because of their "human characteristics". In other words, relating to inanimate objects due to their certain "human characteristics". In real terms, artificial intelligence is meant to help professionals, organizations and individuals do mundane and tedious tasks speedily with the characteristics of a helper.

In real time, the task before the professional accountant is a routine and customized duty that requires repetitive input. Artificial intelligence application takes off this burden by taking up the task from the accountant, thereby, reducing the work load and improving the professional effectiveness in other areas of the job specification such as management consulting.

1. Challenges of Artificial Intelligence (AI) Acceptability in Nigeria

In Nigeria, a study by Robinson (2018), identified some of the challenges of accepting artificial intelligence applications to include

- **Complex Algorithms:** artificial intelligence is made up of huge amount of data and complicated algorithm which is a widely part of the technical side of artificial intelligence. Many researchers in Nigeria are utterly ignorant of these algorithms and technology, which makes it challenging for them to comprehend how AI works and as such avoidance of challenging task is rife.
- **Human-machine interface for artificial intelligence:** the advanced skills needed to connect Nigeria with AI technology are in low supply and as such Nigerians are unable to get the most out of artificial intelligence; this result to a human skills gap in data science.
- **Reduced Investment:** the unwillingness of some managers and business owners in Nigeria to invest in artificial intelligence is another issue with the technology. Not every business owner or organization in Nigeria can invest in artificial intelligence due to the high cost of setting it up and using it.

-Software Failure: constant crash of hardware and software systems in Nigeria can be frustrating. Although no human technology is faultless, but in Nigeria, storage and retrieval mechanism is abysmal. As a result, human performed software tasks may be challenging to track. This kind of issue can be demoralizing and infuriating.

-Religious and cultural barriers: the two biggest obstacles to progress in Nigeria are prejudice based on cultural identity and religion; thus, AI technology is not exempt. Individuals with the same tribal affiliation tend to be biased in their cooperation with those from different tribes, particularly when it comes to knowledge acquisition. Similar to that, there is so much religious intolerance in Nigeria that it could substantially hinder AI development. For Sanni, Adeyemi & Bakare (2022) challenges that face the Nigerian professional in the adoption of artificial intelligence application include:

- Investment: artificial intelligence technology is very expensive; the cost for installation and maintenance is beyond the reach of the average businessman in Nigeria. The average business and the government is yet to fully incorporate AI into their value chain.
- Software Malfunction: The automation system in which the artificial intelligence works on does not give space for an independent decision-making process. Instead, a decision-making power is controlled by machine and algorithms.
- Lack of Political Will: The incessant change of government after successive election necessitates a state where implementation of artificial intelligence becomes near impossible. This is due in part to the change of government where the current government might abandon the project of the previous government or give it out to their stooge who might not be able to carry out the task. More so, electricity is needed for the full implementation of artificial intelligence, however, Nigeria is known to have an epileptic power supply. This is a major obstacle that must be overcome if artificial intelligence is to be adopted by professionals in Nigeria.
- Limitations: AI, like any other technology, has limitations; it basically cannot carry out all tasks. However, it will result in the appearance of a new job sphere with multiple job profiles of varying quality.
- Data Security: Due to the sensitivity of the massive classified data used by AI which oftentimes are personal and responsive, a lot of data theft, data breach as well as identity theft always occur in cyberspace. This is a big obstacle for business start-ups all over the world.

In a different light (Okwor, 2022) identified the following challenges as some that are facing the Nigerian professional include:

- Building trust: Artificial intelligence is a complex and complicated system. It is basic human psychology to stir away from complicated things. The massive amount of data and algorithms that are required for artificial intelligence are often times the comprehension or capacity of the average person, so they tend to avoid it.
- Investment: Another challenge of AI is that all businesses are keen to have need of a position in it. However, the funds required for full implementation of AI is exorbitant, hence not every business can invest in it.
- Software malfunction: Computer programmes are not free from errors. Software is bound to fail or malfunction. In most cases, it is difficult to locate the cause of the problem. With humans, tasks performed by people are constantly followed, but that of a programme crash might be tedious to find out.
- AI is not indispensable: AI is an instrument that strengthens and improves the implementation and productivity of humans. There is need to comprehend the fact that not all tasks can be handled by AI. It only has the control to operate all the common tasks with machines and allows you to do more useful errands alongside your time.

Artificial intelligence's potential in the technological world

For many years, science fiction has been fascinated by the idea of artificial intelligence (AI). This is a kind of "deep learning" that enables computers to independently digest information at a highly sophisticated level, enabling them to carryout challenging tasks like facial recognition. Scientists have made achievements in

"machine learning," employing neural networks, which replicate the activities of biological neurons. Many scientists believed that progress in AI technology had finally reached a point of stability. Yet, "Bigdata" is accelerating the development of AI, which is expanding potential for the future Robinson (2018). Here are a few potential applications for AI technology.

1. Transportation automation

Self-driving cars already exist, but for the time being, they must always have a driver at the wheel for safety reasons. Despite these intriguing discoveries, it will take some time before driverless automobiles gain broad adoption. Yetin (2012), when Google started testing self-driving cars, the US Department of Transportation was compelled to publish guidelines to regulate various degrees of automation. Other self-driving modes of transportation, including buses and trains, are anticipated to appear soon.

2. Technological cyborgs

Our own bodies and intellect are the main constraints of being human. Researchers have predicted that people would be able to use computers to boost many of their inherent skills in the future. While many of these potential cyborg upgrades would be included for convenience, some might have a more useful function. AI, for example, will soon be utilized to give amputees more control over prosthetic limbs by enabling brain-to brain communication with the devices. The limits that amputees currently face on a daily basis would be greatly reduced by this form of cyborg technology.

3. Assuming risky tasks

Some of the most dangerous occupations, like defusing bombs, have already been replaced by automation. These drone-like devices, which are utilized as the physical counterpart to defuse bombs but require human control rather than artificial intelligence, are not quite robots yet. Regardless of their categorization, they have taken on one of the risks to occupations in the world and saved hundreds of lives. We'll probably see more AI integration as technology advances to support the operation of these devices. The incorporation of AI is also being investigated for other vocations. Robots will eventually replace humans in jobs like welding, which is notorious for emitting harmful fumes, extreme heat, and deafening noise.

4. Robotic companions

As most robots are still emotionless, it is challenging to imagine a robot that you could emotionally connect with. But a Japanese company has taken the firsts significant steps toward creating a robot companion that can comprehend and feel human emotions. Pepper was created in 2014 and used. The Pepper companion robot was built in a bout 1000 pieces, and all of them were sold in 2015. The robot was designed to understand human emotions, experience emotions of its own, and support the happiness of its human friends. Soon, more advanced friendly robots will undoubtedly be created.

5. Robots serving as doctors

At the moment, robots in the medical industry work with humans to perform operations or treat patients. Nonetheless, it is anticipated that fully autonomous surgical robots, capable of making their own decisions, would one day be employed to do operations without the assistance of surgeons or medical professionals.

6. Better housekeepers

The huge demand for home workers around the world is due to the fact that daily life is difficult for many people. As a result, finding and paying for home employees to supervise their care is becoming more and more difficult. This necessity can soon be replaced by AI because of its current state. Home robots may soon take the place of domestic helpers, enabling elderly and disabled people to live comfortably in their homes for as long as feasible. It will also be duplicated to house guard robots, which will serve as gatekeepers or security guards at residences.

Findings

1. The elimination of the human factor through automated technologies is causing dread amongst professional especially accountants and this have led to reluctance of its usage by professionals.
2. The prospect of artificial intelligence in professional services is enormous, however, implementation is slow. This is due in part to the level of funds that is required for such a venture.
3. Hacking of data is one threat that face the use of artificial intelligence in Nigeria

Conclusion

This study concludes that artificial intelligence application has positively influence on operation of businesses of various professions amidst the challenges of artificial intelligence applications in emerging market. When applied properly, artificial intelligence is a veritable tool that should be leveraged by any profit-oriented business. In the future, it is predicted that artificial intelligence system will take up more of accounting operations and decision-making tasks from humans; this is because, the accounting profession is characterized by tedious and repetitive tasks which would be shifted to machines for efficient and effective accounting operations. The accountant needs to strive harder in order to beat competition by delivering quality services to her clients through harnessing opportunities for rebranding, reengineering and radically improving the business and investment decisions which is the ultimate purpose of the profession.

Recommendations

1. The coming of artificial intelligence into professional services has brought ease of work. However, there is great fear that it could replace the human element in accounting. It is recommended that accountants make use of artificial intelligence applications in areas where the work is heavily mundane while, the areas of consulting (where human contact is highly needed) be left for humans to carry out.
2. The accountant view point of “routine-work” (which can easily be performed by artificial intelligence) must shift to “strategic thinking” (which would be a little harder to copy by artificial intelligence). More so, employees are encouraged to develop a novel set of proficiency revolving around data in the profession.
3. Government should set up a strong regulatory framework that can address the threat of hacking data of professional from their database. They can also invest in cyber security and data protection to give the professional a safe haven for operations.

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