



ARTIFICIAL INTELLIGENCE: A PATHWAY FOR THE ACCOUNTING PROFESSION**By****SANI, SAMINU¹, INYANG, ERNEST EBONG²**^{1,2}*Federal University, Wukari, Taraba State, Nigeria**Corresponding authors' email and mobile: sanisaminu4u@gmail.com/2348069254272¹,**kizitoinyang@gmail.com/+2348036706125²*

Abstract

Information provision is the hallmark of accounting and the complexities tied to businesses and practices of accounting is posing a threat to quality of accounting information, hence the idea of artificial intelligence in handling accounting problems. With evolution in business idea and accounting practices, artificial intelligence (AI) provides a platform for accountant to be pro-active in providing financial information. Machine learning, neural network, robotic technology and fuzzy logics are some of the commonest AI technology that enhances the machine to act like human with a view to executing task with accuracy and relative ease. This study is basically a review of prior works in connecting the nexus between artificial intelligence and the various field of accounting. The field reviewed were auditing, taxation, management accounting, public sector accounting, and financial accounting. Literature showed that, artificial intelligence is imperative for effective information provision because of its speed and accuracy but, it comes at a huge cost which made many organizations to avoid the application of AI enabled devices in financial reporting.

Keywords: artificial intelligence, fuzzy logic, neural network, simulation and robot

1. Introduction

Accounting basically is an information science that specializes in the collection of data, its processing, and provision of useful information to decision makers for making informed decisions (Zhang *et al.*, 2020). Information provided by accountants only becomes useful when they are correct and timely. When the information is inaccurate and comes in late, it impacts adversely the choices made and it may cripple corporate growth and existence. Lehner *et al.*, (2022) asserted that, to ensure that, accurate and timely reports are prepared, the accounting profession should align with globalization and scientific innovations in the area of robotic engineering and physical sciences so as to align itself with the increasing robotic intervention in accounting profession. Accounting is a broad discipline with vital areas such as auditing, cost accounting, financial accounting, management accounting, and taxation. These areas are becoming more complex with the increasing complexities associated with businesses; thus, an effective mechanism is needed to address the problems.

Just like the human evolution from primitive society to the advanced era, the accounting profession; a subset of human endeavor is expected to undergo positive changes that will propel the profession to satisfactory level. Accounting underwent certain changes that saw it progressed from the manual computation of accounting information to the computerized phase that involves the computer systems (Jan, 2021). The trend has led to a more advanced system of artificial intelligence that involves the use of certain robots and software that are more efficient and effective than its human counterparts (Mardini & Alkurdi, 2021). The steady rise in the use of artificial intelligence has ushered in automation and



intelligence which negates the stands of the traditional accounting role. With automation and robotic presence in accounting engagements, the dawn of a new era is ushered and it may be both a blessing and a curse depending on who profits from it and vice-versa (Liu *et al.*, 2022).

Artificial intelligence (AI) is termed the ability of a digital computer or robots controlled by a computer system with a view to performing task associated with intelligent beings (Liu, 2021). The computer system or robots are built to possess human attributes of processing and reasoning information so as to make future forecast in decision making. In designing the computer system, intelligent features are incorporated so as to facilitate the computer or robots in processing information in other to make informed decision. AI enable systems or robots can interact with humans and so, possess the ability to be critical in reasoning with past and future line of action. Gu (2021) asserted that, AI systems is a new trend to globalization and rapid economic growth and development and as such, accounting profession should be in the forefront in adopting this innovation because of the increasing complexities that the profession is tied to.

Overview of Artificial Intelligence in Accounting

The over increasing accounting task and complexities associated with the accounting profession over time has called for a more proactive and real time mechanisms in handling and processing accounting information. The need to reduce the task of accountant and provide an efficient and alternative mechanisms that acts in place of accountant has pushed for the use of computer enable intelligence software or robots to process information faster, easier and more efficiently. Greenman (2017) noted that, these devices are built by humans and embedded with reasoning faculty to enable them act and behave like humans in processing and analyzing information. The simulation device in it, grant it that sense of reasoning to interact with data as if a human is handling it.

Technological inventions have been the cornerstone upon which modern businesses thrive (Mosteanu & Faccia, 2020). Therefore, the accounting profession is no exception to this general rule because of the numerous benefits that are tied to technological growth (AI). Guo (2019) asserted that, technological evolution in accounting has gone through lengthy path, therefore, knowledge of accounting in the pre-digital era is essential so as to appreciate the strides achieved with the use of artificial intelligence in financial reporting and other accounting task. The double entry popularized in 1494 by Luca Pacioli (father of accounting) set the stage for technological innovations in the field of accounting, by rationalizing the principles in operation in the Italian Renaissance period which is still relevant till date. The cash register came on board following the American Civil War to reduce theft and promote accountability and transparency. The Spreadsheet Revolution held sway in 1969 and it moved accounting from the traditional angle to an easier, efficient and effective system. This revolution ensured that, accountants were having a system that makes work less stressful and more efficient (Ayad & El-Mezouari, 2022). The Language for Programming Arrays at Random (LANPAR) became the first electronic spreadsheets made and was used for budgeting of some major companies such as General Motors. The spreadsheet revolution was delayed for a decade because of the cost associated with computers in the '60s but picked up in 1979 after the introduction of spreadsheet in microcomputer by Apple II.

Furthermore, the spreadsheet was revolutionized in the '80s by International Business Machine's (IBM's) Lotus 1-2-3 which was halted in the year 2013. Microsoft excel was ushered in 1985 to ease the



task of computation and it has performed incredibly well since its emergence. Automation of task became easier as well as tracking of expenses and errors. This software has become an essential pillar in accounting profession as aspiring accountants are required to possess mastering of the software. These innovations have ushered the profession to a more advanced and efficient way of operations. Artificially intelligent systems or robots are created to oversee the task of accountant as they possess the intelligent traits that allows them to reason and act just like human but in a faster and more efficient way (Ayad & El- Mezouari, 2022). AI-powered accounting software have the capacity to automate multiple tasks concurrently, identify potential problems and provide a possible course of action in solving such problems. AI inventions comes in the following dimensions among others; neural network, robotic technology and fuzzy logics.

Taghizadeh *et al.*, (2013) noted that, neural network is a branch of artificial intelligence that is concerned with electronic simulation of the neural network which exist in the human brain. Learning abilities are incorporated into neural network so as to simulate or imitate the brain. It grants the technology the power to reason and act like human. A robotic AI enabled technology allows a robot to be built with artificial intelligence using programming language to act in place of human (Greenman, 2017). Taghizadeh *et al.*, (2013) asserted that, a unique aspect of AI that allows the machine or robot to think like a human being is referred to as fuzzy logic. It is structured to possess the decision-making abilities of human, governed by partial truth (untrue to true). It is a special feature that regulates thinking abilities of the AI technology and then grant it the power of making choices from arrays of options. To accounting, this AI technology are catalyst that speed up processing of accounting information with relative ease and accuracy. Accounting is a global profession and it is an integral component of every business venture. The growth of modern businesses is tied to the quality of accounting information it has. Thus, the numerous benefits tied to AI technology should be embraced by accountant to facilitate decision making purposes.

2. Literature Review

Artificial Intelligence in the field of Accounting; a Literature Nexus

Artificial intelligence has been incorporated into various phase of human existence and accounting profession is no exception to this innovative advancement (Ayad & El- Mezouari, 2022). Considering the features of accounting and the ever-increasing complexities around accounting as a result of business growth and expansion, the use of artificial intelligence has become imperative so as to be able to achieve the desired objectives with minimal effort necessary. The use of artificial intelligence has improved accounting task with certain elevation from traditional accounting practices to a better and more refined approach in solving task. Artificial intelligence adoption has succeeded in solving problems like; untimely financial reporting, inaccurate and erroneous accounting information as well as high cost of labour associated with employing several individual to perform task that will be completed with AI inventions in small time. However, the application of AI innovations has created certain social malady like unemployment which has adverse effect on the economy.

Zemankova (2019) asserted that, Deloitte, a big-4 audit firm announced it first commercial artificial intelligence technology in the practice of audit so as to ensure speed of completion of task with minimal



errors and greater efficiency. They incorporated AI sensitive devices that are capable of interacting with data just like human and process it within the shortest time possible. These devices are programmed to carefully and tactfully; interact, see, process and produce final output to guide informed decision making. The fluidity of the AI enabled devices creates an atmosphere for executing task with relative ease and satisfactory accomplishment.

Mosteanu and Faccia (2020) examined digital system and the challenges of financial management which were associated with blockchain and cryptocurrencies. The study explored these fields with AI enable technologies and they found out that, complexities tied to accounting has become increasingly high that will be very cumbersome for humans to handle. As such, an AI enable technology created with sensitive accounting information can process such complex activities with ease and come up with recommendation within the shortest time possible. The study concluded that, blockchain technology and cryptocurrency accounting are efficiently handled by AI technology. Similarly, Kasy (2018) noted that, AI machine learning provides optimal taxation and insurance claims because the technology is built to be sensitive with no bias mindset. Hence, exact information is sourced and processed to achieve the desired goal on time.

Artificial intelligence in the field of Auditing

Rick (1999) defined audit as “a systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between these assertions and established criteria, and communicate the results to interested users.” In other words, it simply connotes independent examinations of a firms' book in other to ascertain the true and fair view of the financial report of the firms. Since audit involves large number of information and records, there is a need to employ artificial intelligence so as to reduce the time frame and increase accuracy of the engagement. Debreceeny and Gray, (2010) analyzed journal entries in audit using data mining methods because of the enormity of the data audited.

Fisher *et al.*, (2016) examined accounting, auditing and finance using the applications of Natural Language Processing (NLP) which was augmented by Machine learning. The result showed that, the use of artificial intelligence has proven to be a useful mechanism in enhancing continuous auditing with ease and accuracy. The overly sensitive nature of the AI enabled devices ensure that complete information is gotten and processed in other to come up with opinion. Zhang and Wang (2021) used an artificial neural network technology to develop a financial audit model to be used by auditors in the financial audit estimation. These AI enabled devices are built to accommodate large expanse of data and the machine has special sensitivity to accurately process large information within a short time. Warner and Gehrke (2015) in multilevel process mining for financial audit noted that, the numerous operations required in audit has necessitated the application of AI enabled systems to accurately and speedily complete task.

Zemankova (2019) explored the construction of financial auditing teaching mode which was based on the artificial intelligence and noted that, audit involves various activities tied to various stages which becomes cumbersome and can lead to certain omissions from the auditors but with artificial intelligence enabled devices, multilayer activities can be happening at the same time with accuracy and



speed. This in turn enable the auditor to complete work schedule within the shortest time possible and provide an expert opinion. Similarly, Lehner *et al.*, (2022) asserted that, artificial intelligence mechanisms aid auditors in providing expert opinions because of the level of accuracy of the AI enabled devices. The use of AI enabled systems ensure that, all transactions related and relevant to the audit are objectively scrutinized and partitioned into appropriate classification to provide simplified platform for decision making.

Artificial intelligence in the field of Management Accounting

Transformation of accounting information from financial accounting to management accounting has become; easy and highly efficient with the adoption of artificial intelligence (Liu *et al.*, 2022, and Guo 2019). They noted that, the special intelligent feature of AI devices has equipped it with high-definition sensitivity to collect large number of data, process it and transform it to suit the management needs in decision making. If this task is to be undertaken by humans, the element of human frailty sets in and the outcome may not be as plausible as when it is undertaken by an AI enabled machine. For management accountant to be effective, they need the support of these devices (AI) to properly get quality data within the shortest time possible

Ping (2021) explored data mining and XBRL integration in management accounting information which is based on artificial intelligence. The study found out that, data mining technology aided by artificial intelligence is very efficient for firms to be able to analyze large expanse of data with relative ease and process the information thereto so as to make informed decision. The conclusion drawn was, artificial intelligence has become an integral part of data processing. In addition, Zhang (2021) asserted that, the use of artificial intelligence has become imperative in data mining because of the enormity of accounting information that has to be processed. If left for humans, it can lead to extreme time waste and sometimes have adverse consequence on the mental health of the accountant processing it. Machine language enabled AI simplifies the task and ensure accuracy of the information processed and help management accountant by extracting ingredients of the account that are needed by management accountant for decision making purposes

Artificial intelligence in the field of Taxation

Atayah and Alshater (2021) used artificial intelligence mechanisms on tax administration on the context of emerging technology and found that, use of artificial intelligence provides the needed platforms for effective tax admiration because of the multiplicity of transactions and tax systems in place. It helps in curbing errors that may arise in tax administration and computation and hence, ensure that tax authority do not go into double taxation for the tax payers. Also, De Roux *et al.*, (2018) in a comprehensive study on tax fraud detection through neural network asserted that, the use of artificial intelligence in modern taxation has significantly curbed tax fraud perpetrated through tax evasion. The AI mechanisms are built with intelligent sensitivity that allows them to be objective and to ensure all transactions are recorded in the appropriate class to ensure accountability and appropriate tax ascertainment.

Perez *et al.*, (2019) explore tax fraud detection through neural networks from the samples of personal income of taxpayers. The study documented that, errors and fraud usually happening in the



computation of taxes of personal income taxes are becoming less likely with the adoption of AI enabled mechanisms. This is because of the ability of the device to multi-task with speed and accuracy in achieving a specific command. Furthermore, Tian *et al.*, (2016) explored mining suspicious tax evasion groups in big data and found that, prior to artificial intelligence mechanisms, firms dealing in large data has the prospect to engage in tax evasion undetected but the use of artificial intelligence in such companies had drastically eliminated tax evasion because of the overly sensitive artificial intelligence device. Therefore, modern taxation in companies should be encourage to adopt artificial intelligence so as to get factual financial report rather than financial reports that are window dressed.

More so, Chen *et al.*, (2011) examined the application of neural networks for detecting erroneous tax reports from firms in the construction industry and noted that, the use of artificial intelligence in construction companies has reduced erroneous computation of taxes because of the accuracy involved with AI enabled devices. These devices re built with special sense that allows them to process large amount of data with speed and accuracy so as to be able to make informed decision from the result thereto. To this position, Fisher *et al.*, (2016) opined that, artificial intelligence should be incorporated into learning curriculum in accounting so that, aspiring accountants will be conversant with the use of AI enabled devices in handling complex accounting task and responsibilities.

Artificial intelligence in the field of Public Sector Accounting

Government accounting involves accounting that is focused in government sources of revenue and expenditure which is tied to a specific time frame. This accounting exists in the three layers; particularly in Nigeria; federal, state and local government. It involves large number of data and different layers of accounting activities that needs to be meticulously handled to avoid error or fraud from some dishonest employees. To curb these unethical underhand dealing, AI enabled devices with special linguistics ensures that, all transactions are monitored and processed with objectivity (Lehner *et al.*, 2022). Alfian (2017) examined the development framework of expert system application on Indonesian government accounting system and found that, the use of AI enabled devices significantly keep track of accurate and real time financial information in government activities and as such, it curbs the problems associated with fraud.

Mosteanu and Faccia (2020) noted that, with government admission of block-chain technology, the use of AI enabled devices becomes imperative so as to be able to keep track of all financial flow for effective taxation. This argument is premised of the ground that, capacity ensures adequate productivity. If the government lacks the capacity to know financial flows from these block-chain technology, they will be unable to adequately determine the taxes of these companies. To buttress this assertion, Kasy (2018) asserted that, optimal taxation and insurance are possible with machine learning (AI). That, these devices are designed to keep track of every transaction with absolute detail and accuracy to ensure effectiveness in decision making. Since government activities are numerous and undertaken by different individuals, it becomes pertinent to have a system on ground that is fast, accurate and reliably intelligent so as to avoid underhand deals.

Ayad and El-Mezouari (2022) noted that, artificial intelligence technology has been reported to be of significant importance in government establishment because of its speed and accuracy in obtaining and



processing data. Khtira *et al.*, (2007) examined data on Moroccan public sector and noted that, AI enabled technology used in government undertakings in Morocco has the power to process multiple data layer with absolute accuracy and speed. This ensures that informed decisions are reached based on factual data. The use of artificial intelligence in government undertaking promotes transparency and accountability since all information are processed with accuracy because of the sensitivity of the AI enabled devices. Fluidity in government accounting is enhanced with the use of AI enabled technology because of the; accuracy, dexterity, speed and the flexibility of the machine to rationalize transactions with human reasoning

Theoretical framework

For the purpose of this review, the contingency theory and the agency theory are used to underpin the study. For the contingency theory, accounting information is dependent on some contingent factors such as digitization and rapid technological breakthrough (Ismail *et al.*, 2010). That the external environment constitutes the fulcrum for the evolution and implementation of accounting information system. The accounting information system is then contingent of factors from within and outside the firm such as; economic, political, technological and socio-cultural. Artificial intelligence serves as the agent of the principal (shareholders) in checkmating the excesses of opportunistic managers in firms. AI enabled technology are fast and accurate as such, they ensure fraud is reduced to the barest minimum by taking into account all transactions regardless of whose desk it emanates from (Li, 2019). They act as agent to the principal in disrupting opportunistic behaviors of managers and members of staff by ensuring that genuine and accurate transactions are recorded and processed.

3. Methodology

The study is an explorative one that reviewed literature in the field from different areas of accounting.

4. Discussion

Artificial intelligence is a force to reckon with in the 21st century because of its plethora of importance. It facilitates the quality of accounting, transform accounting practices, optimization of staff ability as well as ensuring timely and accurate financial reporting (Ayad & El-Mezouari, 2022). The application of AI technology open paths for new job. It involves training of accountants in testing ? nancial models or algorithms for auditing and in managing problems so as to integrate results into business processes. AI technology are highly beneficial to firms but in spite of these benefits, there are certain misgivings about artificial intelligence.

Artificial intelligence devices are still reliant on human impute for it to function effectively; it cannot replace human (Li, 2019). It competes with accountant for employment because of it effective multi-tasking (Kasy, 2018). Malfunctioning of the devices can lead to innumerable errors that can be totally misleading and the cost of AI technology is significantly high (Mosteanu & Faccia, 2020). Therefore, it is pertinent for the accountant to cultivate a healthy relationship with the artificial intelligence mechanisms so as to achieve the desired level of achievement.

The use of AI enabled devices may have adverse effect on recruitment of traditional accountant, however, it impacts significantly on; the quality of accountant, transformation of the traditional



accounting system to a modern system and the overall improvement in decision making. The application of AI enabled technology has led to optimization of accountant's duty by providing them with the needed platform to conduct their work with modern facilities. Despite the fear of job competition between accountants and AI enabled devices, the artificial intelligence cannot exist without accountants' inputs in programming the device and interpreting the final output. Therefore, accountants need to harness the spectacular of the AI technology so as to be able to achieve the overall objective of financial reporting in firms.

Global spending on AI enabled technology in 2019 stood at \$37.5 billion and that amount has doubled by more than twice in 2023 to \$98 billion (International Data Corporation, 2023). This cost is astronomically high as such, firms are getting reluctant to venture into AI technology because of the financial commitment of such technology. This increasing AI cost is impacting adversely on the profit as such, firms choose to maintain traditional accounting role to save cost. The initial capital outlay is huge and this is a serious problem to some firms which often discourages the use of AI. However, Ayad and El-Mezouari, (2022) noted that, firms are now relentlessly pushing through with AI in spite of it cost because of the long term benefit it has on the accounting segment of the firms.

5. Conclusion and Recommendation

The main role of accounting is the provision of information to guide decision makers so as to make informed decision. Artificial intelligence technology in accounting, as an emerging segment involves the use of scientifically intelligent technology that helps accountant in processing information with accuracy and speed so as to meet with organizational need for information. These devices are complementing the task of accountant by ensuring that responsibilities are completed on time with minimal errors possible so as to guide decision makers in making informed decision. Literature on the connection of artificial intelligence to accounting were reviewed across several areas of accounting such as taxation, management accounting, financial accounting, auditing and public sector accounting. These literatures showed that, application of artificial intelligence significantly improves all the field of accounting because of it speed and accuracy. However, artificial intelligent technology comes at a significant cost and as such, some organization may not be able to afford it. The cost associated with it discourages firms and government from using it.

Artificial intelligence is an important tool needed for accounting to thrive and be pro-active rather than being reactive. Therefore, investment in artificial intelligence for accounting purposes by firms and government is sacrosanct considering the complexities that are tied to businesses as well as the complexities surrounding the accounting profession. To compete in the international stage, there is the need to comply with global best practices, thus, firms and government are expected to engage the use of AI enabled technology to easily complete accounting task within the shortest time possible with high accuracy.



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