



Engineering Technology and Accounting Science: Evolution and Futures Agenda

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ABSTRACT

This paper makes a novel inroad into engineering technology influence on modern accounting science and therefore provides awareness to accounting and finance professionals, the corporate and educational institutions on how engineering technology has become inextricably intertwined with the practice and learning of accounting. The paper thus aims to highlight how engineering technology has influenced and is rechanneling accounting mode of operations and function through the advancement in information technology apparatus. Using a conceptual approach, it shows how accounting has become synonymous with engineering technology and as such triggers the impetus for revamping accounting curriculum to accommodate the fundamental aspects of engineering study before concentrating on the core accounting modules. Accordingly, the paper makes initial recommendation for some information technology (IT) modules to form part of future accounting engineering curriculum. The IT modules that are proposed includes *inter alia*, cloud accounting, 5G Network and IOT Hardware System, Field-programmable gate arrays (FPGA), 3-D circuit architecture, Internet of Things and Industry 4.0, understanding and operation of Context-Aware Engine (CAE).

Key words: Engineering Accounting, technology, accounting science, big data, accounting curriculum

1. INTRODUCTION

One of the greatest business disruptions of the 21st century is the explosion of engineering technology, which is made possible by digital science. The offshoot of digitalisation has even brought more disruptions to business and accounting processes through further technology invention such as big data, Industry Internet of Things (IIoT), cloud computing, industry 4.0 and robotics, data analytics, etc.,. These and more in the new world of engineering technology are influencing accounting science, which is the financial information hub for every business and every organisation. Therefore, the objective of this paper is to present conceptually how engineering technology has evolved with accounting and how accounting has become inextricable and hence needs a future engineering orientation that should be made possible through a re-curriculum into engineering accounting. A sample of suggested engineering concepts to be integration in such curriculum is presented in the last section.

2. EVOLUTION OF ENGINEERING TECHNOLOGY IN ACCOUNTING

Digital technology innovations have upgraded the accountant's capacity to translate information effectively and viably. Presently an accountant has the capacity to translate the parlance of trade with such ease that the accountant is seen as the corporation's most trusted advisor[1]. Going back the century lane of accounting and technological development, the first that appears to the mind is the development of one of the first pragmatic support to computational operations, namely the Abacus; it originated from the West and spurred by the Greek following the expansion in trade in the early seventh century [2]. Following the first adding machine, which was used in accounting, the engineers invented the calculators, which provided astronomical speed and ease in calculation [14], [15]. Despite the invention of adding machine and calculators, the accountants finance jobs were still processed and communicated through physical paper documentation, only the speed accuracy of number additions were improved. Moving toward, the 20th century, engineering technology brought light to the accountant's function with the application of computers and software, which came with manifold accuracy, speed, storage and communication of accounting function [16], [17]. Computer technology provided accounting with electronic spreadsheets via the Microsoft Excel [18]. Thanks to engineering technology – the arrival of computers to the accountants' table made the adding machine, calculators and ledger to go moribund. From the introduction of modern computer technology to accounting, the accountant is now working in synergy with accounting systems software programmers who develop digitalized accounting process to track, organise, store and analyse customers' information [12].

Furthermore, information technology application in accounting has provided the intranet and extranet technology to digitalise the e-business processes, which thus expands the market offering of the organisation – but the organisation must have sufficient installation of enabling engineering technology to enhance electronic business functionalities[1]. The modern information technology has also progressed to provide additional digital storage space in the cloud even to a limitless band, hence accounting data can be stored away both for safety and for limited space available in office right into the cloud – popularised as cloud computing [13]. Some high-tech cloud computing providers

include *inter alia*, the Microsoft, Google, and Amazon, whose cloud computing services make it easier for accountants to use systems software to access their financial data anytime and anywhere. High-tech innovation has therefore ushered more technological advancement opportunities for accounting processes– these include amongst others the big data, 5G, artificial intelligence.

The increasing expansion in the machine power of modern computer has ushered the use of big data to improve current business sagacity and to conjecture future events that affects the financial wellbeing of the organisation [19]. A mega data evolution in the world of data management is the big data mining and analysis through the application of advanced computer software programmes[19]. Big data application to the accounting and finance profession is boosting financial decisions and planning as current data referred to as “big” has moved beyond numeric data to include unstructured data, which can be subjected to complex computer analysis by using machine natural language to decode otherwise complex accounting and financial information within the fourth industrial revolution [11]. The accounting and finance ability to improve efficiency and effectiveness is enhanced when more robust data are collected and analysed through advanced computer systems – the effect is more accuracy in understanding the financial market and clients financial wellbeing – currently and in future through data forecasting.

In addition to the foregoing, the engineering technology is recently bringing into the current computer aided accounting another advancement called the 5G (which is the 5th generation) cellular network technology [11]. This is an advancement in current smart computer accounting systems to an unprecedented smarter quantum computing, which will take accounting information to another higher level of transformation – thus narrowing the gap between accounting and engineering and making sense of the need for current and mostly prospective accountants to acquire basic engineering skills.

3. RELATED LITERATURE

The 21st century is faced with explosive technology competition brought about by information technology advancement that has resulted to the application of accounting information system programs in accounting processes, and successful businesses requires that organisations should adapt and compete with peers in the industry by applying necessary engineering devices with relevant information technology in their processes [20]. However, this requires having technology-skilled managers such as accountants in their pool of human asset [3]. This has further made it necessary for accounting and finance operations to adopt the Robotic Process Automation (RPA), which is a purveyor of industry 4.0 into the accounting and finance process of the organisation [4].

Some researchers have endeavoured to clarify the impacts of information technology (IT) on accounting frameworks [5],[20]. The greatest influence of IT thus far on the accounting is believed to resonate with the enhanced skills

and operational capacity of business and industry toward creating and utilizing computerized and digitalised accounting operations and processes, which is used to monitor and document financial and service transactions[20]. Information technology systems and computer systems have curtailed operating time previously used by accountants to analyse and prepare financial reports to enable decisions and planning function of corporate administrators [6]. The computerised accounting system improves the ability of companies to make tailor-made financial reports swiftly and smoothly for managerial planning and optimum result[16]. Other technology-enhanced functions of computer integrated accounting systems are: enhanced system functionality, enhanced precision, quicker processing, and enhanced understanding of external business environment[21]. According to [6] the contribution of Information technology in accounting and control practises cover many functions ranging from proficiency improvement to a more theoretical intervening part. Information technology affords a data environment that encourages a coordinated and adaptable operations. Information technology application to accounting has therefore emerged as a basic, inevitable conveyor of accounting data [20]. This has empowered and encouraged the materialization of the purposes of bookkeeping through the utilization of innovations such as the Web and computerized communications, computer program and database arrangements. Extant information technology-related accounting researchers have illustrated that changes in corporate administration are driven by a coordinated data stage encouraged through data innovation developments[7],[8].According to[4]Data technology has proven to be highly effective in diminishing the time required for preparing exchanges and coordinating accounting data. It has also improved significantly the quality of accounting data, and as a result boosted the allure of utilizing information technology in accounting. Hence digitalization may be a fundamental prerequisite for modern corporate accounting.

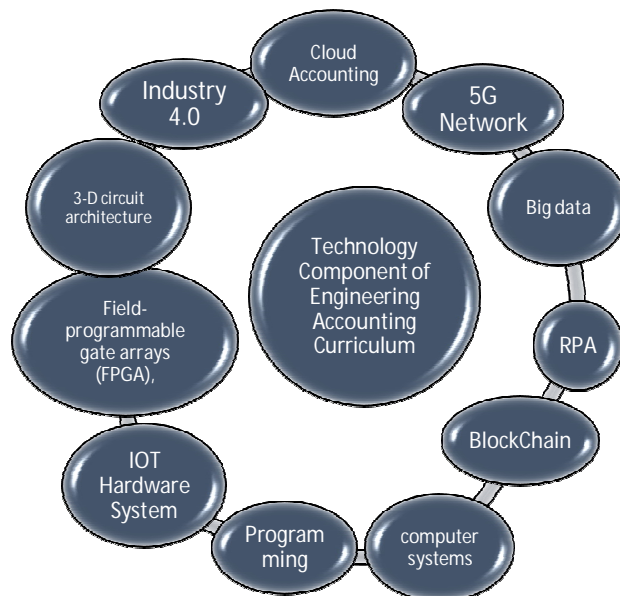
4. FUTURE AGENDA FOR ENGINEERING ACCOUNTING CURRICULUM

Hoffman [9] holds strongly that accounting professionals need a basic knowledge of engineering. It is against this backdrop that this paper proposes the need for engineering accounting curriculum. In support of the IT skills agenda for the accountants, Dillon and Kruck [3] argues passionately along this view, wherein they highlight that current accounting professional practice entails that entry-level skills and knowledge expectation of an accountant requires *inter alia*, ability to apply and integrate information technology to accounting operations and processes [3]. Hence a high level of information technology skill and some engineering skill is desired of modern and future accountants in order to navigate accounting through the modern information system[3]. This view is accentuated by [9], where they opine strongly the need for engineering basic knowledge for accountants.

This paper contributes by proposing a future agenda for engineering accounting curriculum, whereby future accounting candidates should first be immersed in modern engineering technology – that is, a core accounting student should first go through a two year engineering course foundation to acquire the knowledge and practice on modern digital engineering technology, their operations and flexible application to modernize accounting. This proposal is presented in Figure 1. The next three years of accounting study will then focus on core accounting but with the application of engineering apparatuses, different IT programmes and development of new software programmes to bring innovation to bear with the old system of paper-based accounting. This will mean that each phase of core accounting study will be focussed on what digital programme exists to convert such accounting phase to digital mode and what machines are most suitable to handle such analyses competently by the potential accountant to enhance a seamless production of accounting information in a most efficient manner to increase organisational accounting data with the lowest risk of creative accounting practices, that give way to cooking of numbers. The exactness in engineering technology would mean that smart technology applied to accounting processing will have enhanced potential to reduce future financial risk that emanates from mismanagement of manual accounting – thus leaving future risks to systemic or market risks [10]. For now, there are no sacrosanct itemization of what needs to be factored into the engineering accounting curriculum – however, some information technology aspects that future accounting engineering curriculum needs to consider are articulated in Figure 1; this includes *inter alia*, cloud accounting, 5G Network and IOT Hardware System, Field-programmable gate arrays (FPGA), 3-D circuit architecture, Internet of Things and Industry 4.0, understanding and operation of Context-Aware Engine (CAE), and big data.

5. CONCLUSION

This paper set out to contribute to the emerging research on engineering technology and accounting process reformation. The paper has touched on the influence of modern advanced engineering technology on modern accounting science. The discussions in this paper thus provides nuanced insight to accounting and finance professionals, the corporate and non-profit organisations, accounting education advocates and educational institutions on how engineering technology has become inextricably intertwined with accounting and the attendant inalienable modification needed in accounting training. The paper thus highlights how engineering technology has influenced the configuration of accounting practice and rechanneling accounting mode of operations and function through the advancement in information technology devices. Most importantly, the discussions have highlights how accounting has become synonymous with engineering technology and as such needs to revamp accounting curriculum with a foundation in fundamental aspects of engineering study before concentrating on the core accounting modules. Therefore, this paper makes initial recommendation that some information technology aspects, which future accounting engineering curriculum needs to consider includes *inter alia*, cloud accounting, 5G Network and IOT Hardware System, Field-programmable gate arrays (FPGA), 3-D circuit architecture, Internet of Things and Industry 4.0, understanding and operation of Context-



Aware Engine (CAE), and the big data mining and technical analysis.

Figure 1: Proposed Technology Module Composition of Engineering Accounting Curriculum

Source: Author

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