Auditing in the New Age of Industry 4.0:
The Need for More Research

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ABSTRACT

As the world moves towards a knowledge-based economy, technology is rapidly becoming a necessity. As a result, Industry 4.0 is gradually changing the face of many aspects of human endeavour. From manufacturing to construction and business, data analytics, blockchain, and artificial intelligence, among other things, look promising and may bring a paradigm shift within the accounting profession. This may be significantly drawn towards auditing. While technological changes seem rapid, taking giant strides towards revamping the accounting industry via modern kinds of audit evidence and testing, it is important to tread cautiously in the adoption of technology for auditing. This is because even though technological improvements are useful to achieve speed and accuracy in the audit work, they pose challenges of causing loss of jobs, difficulty in tracing errors, and other potential problems. This paper, therefore, looks at some recent technological development in audit work, and why this aspect of the accounting profession may require further research.

KEYWORDS

Artificial Intelligence, Audit Work, Auditing, Big Data, Block Chain Technology, Fraud Modelling, Industry 4.0, Performance Expectancy, Social Influence

1. INTRODUCTION

Industry 4.0 in audit started-off as electronic processing of data and grew based on the increased use of technology in accounting. General Electric was first to utilize computers in accounting in 1954, with very few accountants being able to use computers at the time (Senft et al., 2012). As development entered the profession, smaller computers were designed, and given the lesser prices of these new computer versions, a lot of companies were able to purchase it and train workers on electronic data processing. In 1968, the first accounting software generalized audit software (GAS) came into existence. Once developed, the apex accounting certification body in the U.S had eight accounting companies develop an audit framework. This was the book titled "*Auditing & EDP*" which details the use of computers in auditing was developed (Senft et al., 2012).

The buzzword, *Industry 4.0*, was introduced about a decade ago by the Deutsche government to represent the fourth industrial revolution (Alcácer and Cruz-Machado, 2019; Grieco et al., 2017; Lu, 2017; Motyl et al., 2017; Peruzzini et al., 2017). It refers to an era of improved efficiency brought forth by automation of the many aspects of manufacturing (Lu, 2017; Peruzzini et al., 2017), one

in which the virtual and the real worlds are linked (Baena et al., 2017). Technology researchers and scholars alike have mostly viewed industry 4.0 as the meeting point between cyber and physical system units. This is due to its nature of merging diverse heterogeneous data and ideas into its processes in an optimized manner, using updated algorithms (Motyl et al., 2017; Peruzzini et al., 2017).

As the world moves towards a knowledge-based economy, technology is rapidly becoming a necessity and has found its way into human professional endeavours. The accounting profession is beginning to appreciate technology-oriented progress largely as a result of the speed and quality it offers (Tekbas, 2018). In a report published by Global Financial Integrity, Heydt (2020) emphasized the importance of auditing, stating that it is one aspect of accounting where speed and quality cannot be over-emphasized. As defined by Aghaei Chadegani (2011), auditing is the gathering of information that helps to validate the financial and non-financial standing of an organization (Aghaei Chadegani, 2011). Hence, it requires dependable, detailed and error-free processes, which feeds organizations with the right information needed to make appropriate decisions about their future. Such processes and results can only be offered with cutting-edge technology, such as those offered by artificial intelligence, blockchain, and big data analytics among other things. The present paper contributes to the literature by reviewing and discussing the role of technology in the field of auditing. Specifically, both academicians and auditors will be informed of the importance of computer-assisted technology such as artificial intelligence, blockchain technologies and big data-data mining approach in ensuring effective audit of firms.

Given the potentials of the fourth industrial revolution for accounting and auditing, there are challenges which also pose threats to continuous usage of its systems (Kruskopf et al., 2019). Figure 1 is a schematic representation of the current study.

In figure 2, the potential relationship that could exist between industry 4.0 and some audit functions, if fully harnessed is also described. It shows the interconnectivity between aspects of Industry 4.0 and how they resolve common auditing challenges. Every aspect of Industry 4.0 as shown in the diagram below is able to independently resolve one or more challenges faced in a typical audit work (Alcácer and Cruz-Machado, 2019). It is important to note that beyond the aspects of auditing described on figure, there are several other areas where technology play crucial roles in the auditing process (Gepp et al, 2018).

2. RELEVANT LITERATURE

2.1 Big Data and Internet of Things In Audit Work

Big data is a rapidly emerging tool useful for the manipulation of large data sets (Buyya et al., 2013). It adopts many techniques (e.g., decision tree) for data management and analysis (Oussous et al., 2018). Since data processing is at the heart of the accounting profession, aspects of the field such as projections, forecasting, modelling and detection rely on data for optimal delivery. Some researchers argue that big data techniques have found extensive usage in auditing, with three critical aspects; *distress* and *fraud modelling*, as well as in the *prediction of the stock market* (Gepp et al., 2018) being the central focus. Others believe that auditing as a process is yet to fully appreciate big data use, a situation that has triggered serious outcry amongst several accounting researchers (Acito and Khatri, 2014; Brown-Liburd et al., 2015). While the reluctance of some auditors to fully adopt methods that may be difficult to comprehend by clients has been tagged a reason for under-appreciation of big-data in auditing, this idea was been disproved by Gepp et al. (2018), who noted that only detailed research could lead to a better appreciation and use of big data techniques in typical audit work.

The use of data mining for understanding organizations' going concerns is becoming popular nowadays (Koyuncugil and Ozgulbas, 2012; Sun and Li, 2008). Sun and Li (2008) designed a data mining tool for the failure prediction of over 100 firms using; entropy-based discretization technique, attributes of financial ratios and one class respectively. The decision-tree big data technique was

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