

TRANSFORMATIVE ACCOUNTING AND REPORTING IN A DIGITAL ERA: THE CHALLENGES OF 21ST CENTURY ACCOUNTANTS

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Abstract

The 21st century came along with several disruptive technologies which revolutionized the way businesses are conducted due to the automation and digitalisation of production systems. These have led to several transformative accounting practices in the digital era to cope with such innovations as those challenges competitively affected the accounting profession. The paper discusses some of the challenges that accountants face in the digital era which has inspired transformative accounting and reporting. The research aims to conceptually outline and discuss such challenges from the legal, tax education and training imposed by the company's transformation in the Industry 4.0 context. Industry 4.0 had several implications for the organisation's business model, value chains, products and service delivery.

1. Introduction

The 21st century has witnessed several innovative advancements which have been described by different authors using terms such as digital disruption (Fawcett, 2015; Karimi & Walter, 2015), digital revolution (Lent, 2018), technological revolution (Feki *et al.*, 2013), technologisation (Stancheva-Todorova, 2019), dronovation (Appelbaum & Nehmer, 2017). These innovative developments characterized by the technological revolution in manufacturing have been described as the fourth industrial revolution or Industry 4.0 (Stancheva-Todorova, 2019). At the core of this revolution are technologies such as 3D printing, smart sensors, cloud computing, augmented reality, mobile devices, etc. Such disruptive technologies caused radical changes in the workplace and society (Makridakis, 2017). For instance, Simonite (2016); Deloitte (2015) states that robots are more efficient at operating round the clock. Presently, cloud-based systems are used for data collection and analysis by bots (Appelbaum & Nehmer, 2017). The reduced costs of making drones have increased use in automated processes (Deloitte, 2015). With wide use across industries such as agriculture, production, surveillance, etc. (Deloitte, 2015).

The concept of “smart factories” is an integration of digitalisation into production and manufacturing systems resulting in the creation of Cyber-Physical Production Systems (CPPs). The CPPs are defined as “a smart network of machines, properties, ICT systems, smart products and individuals across the entire value chain and the full product life cycle” (Deloitte, 2015b).

The accounting profession is now faced with an influx of technological change (Appelbaum & Nehmer, 2017). That has transformed the accounting and auditing profession, with the implementation of big data and data analytics among others (Agnew, 2016). Accountants are presently utilising cloud-based technology for operational decision making and real-time monitoring (Appelbaum & Nehmer, 2017). Disruptive technologies have taken up tasks previously performed by accountants in the workplace (Appelbaum & Nehmer, 2017). According to a Deloitte survey, 91% of firm executives forecast the automation of accounts

payable transactions, 55% forecast travel and expense, 36% support fixed assets, 27% agree to the automation of the general ledger, 18% in financial reporting, while, 9% supported payroll and payment cards.

Therefore, the effect of disruptive technologies would concomitantly reduce the reliance on accountants while scaling up risks in an environment such as blockchain and Artificial Intelligence (AI) (Agnew, 2016; Appelbaum & Nehmer, 2017; McKinsey Global Institute, 2017; Rajaraman & McCarthy, 2014; Turing, 1950). It has also been linked to calls by investors and regulators for transformative reporting to mitigate information asymmetry (Marrone & Hazelton, 2019). According to Quigley *et al.* (2020), existing information reporting systems are not properly aligned with stakeholders' needs. Therefore, to build trust among stakeholders and prevent ethical lapses transformative reporting becomes consequential (Anderson & Ostrom, 2015; Losada-Otálora & Alkire, 2019; Parris *et al.*, 2016).

As stated by Gallhofer and Haslam (2019), transformative accounting and reporting have the potential to create change. This includes such as “accounting for biodiversity and conservation” (Zhao & Atkins, 2021); Environmental, Social and Governance (ESG) (GRI, 2011); ‘extinction accounting’ (Atkins & Atkins, 2019c; Atkins & Maroun, 2020). The Global Reporting Initiative (GRI) has recorded significant contributions along the lines of ESG and extinction by developing guidelines for reporting (GRI, 2011).

The effect of technological disruption has been felt in the accounting and audit professions alike; however, research into these areas has been limited (Murthy, 2016). The main challenge faced in our society is how to mainstream transformative accounting and equip accountants for modern-day developments (Jones & Solomon, 2013). This has become an urgent requirement in both the public and private sectors to further demonstrate stewardship and accountability to stakeholders (Siddiqui, 2013). To effectively compete in today's business environment modern day accountants must keep abreast of the broad spectrum of emerging technologies (Guthrie & Parker, 2016). The research aims to discuss the challenges of 21st-century accountants caused by transformative accounting and reporting in the industry 4.0 context. Rapid digitalization has several implications for an organisation and the accounting profession in general that should be considered.

2. Literature Review

2.1 Accounting in the Digital Era

The 21st century has witnessed a plethora of digital capabilities which has disrupted several industries (Karimi & Walter, 2015; Berghaus & Back, 2016). According to Lombardi and Secundo (2021) and Mancini *et al.* (2017), digital capability has transformed the accounting process, management control and reporting systems. The accounting profession has remained on top of the list of jobs most likely to be automated soon (Frey & Osborne, 2017). A position widely observed in several companies (Arntz *et al.*, 2017). Many of the routine accounting functions and tasks not requiring human intervention such as processing financial data (Kim *et*

al., 2017), invoicing and payroll (Gulin *et al.*, 2019) may be easily automated. Digitalization has also been extended to the audit profession; Moudud-Ul-Huq (2014) identified that automation has helped auditors in the following audit procedures: audit planning, analytical review procedures, internal control risk assessment and materiality assessment, among others.

Thus, transformative accounting systems have evolved to deal with modern-day changes and to handle this development. Transformative accounting reflects extended accountability to a wider stakeholder (Calace, 2016). Technology has also offered wider possibilities for accountants on issues such as sustainability (Bebbington & Gray, 2001), stakeholder communication and TBL reporting using social networks (Manetti & Bellucci, 2016). Disruptive technologies have also affected the teaching and research in accounting, both in curriculum and teaching style (Lodhia, 2010; Pan & Seow, 2016). In the recent Systematic Literature Review (SLR) of 43 studies by Lombardi and Secundo (2021), the authors found from the analytical results that research studies in the digitalization of corporate reporting have greatly widened over the years.

Its application to corporate information management and decision-making; as a stakeholder engagement tool and concurrently for sustainability reporting; and, lastly, to curb earning management, aid accountability and improve transparency (Lombardi & and Secundo, 2021). In the study by Herbert *et al.* (2016), the authors found evidence that automation was used by companies to reduce routine (structured) activities. Therefore, the accountants may be availed of ample time to focus on non-routine (nonstructured) tasks which require more in-depth thinking and professionalism (Gulin *et al.*, 2019). The influence of AI and big data analytics on problem-solving cannot be overemphasized as they help provide real-time updates of accounting information (Gulin *et al.*, 2019). Accountants can now better utilize such information for problem solving and decision-making. Big data influence has transcended from financial to managerial accounting but has also affected the audit profession (Cockroft, 2018). In the SLR by Lombardi *et al.* (2021), the authors noted that blockchain has enabled audit 4.0 via smart contracts and increased efficiency while reducing fraud.

2.2 Prior Studies on Disruptive Technologies in Accounting

Saka *et al.* (2019) explored tax data from 148 countries for a period of thirty years using data visualization an Artificial Intelligence (AI) technique. The authors present evidence for both corporate tax avoidance and the downward convergence of tax rates. The study specifically identifies the potential of data visualization tools in accounting research. According to Saka *et al.* (2019) visualisation would offer accountants a fresh perspective from revealing unusual patterns and also reveal trends not previously seen.

Bednárová and Bonso'n (2019) explored the potential of blockchain technology in the accounting process. The authors identified the potential and challenges of adopting this technology. They stated that this technology has the potential to create “smart contracts”, i.e., processes and systems which operate on already predefined rules, thereby lowering administrative costs and increasing speed. Blockchain technology can be utilized in corporations

to provide a secure and private ledger of transactions. The ledger would provide a historical record that cannot be modified, which would have obvious benefits for the prevention and detection of fraud as well as the provision of external assurance.

Suárez-Rico *et al.* (2019) from a Latin American perspective examined the influence of Facebook as smart technology and its corporate use of such to display their corporate social responsibility (CSR) strategy. They found a low media utilisation with only about one-quarter of Facebook posts of the studied organisations related to CSR issues.

Manetti and Bellucci (2016) examined the use of social media platforms, e.g., Facebook, Twitter, and YouTube, to engage stakeholders on sustainability reporting. Using content analysis, they investigated 332 sustainability reports prepared in 2013, according to the Global Reporting Initiative (GRI). They found a relatively low level of interaction and engagement among the firms included in the sample.

Similarly, Lodhia *et al.* (2020), using a sample of top 50 firms listed on the Australian Stock Exchange (ASX) across three platforms Facebook, Twitter and/or LinkedIn and information analysed using content analysis showed limited use of social media however companies that used justifiably sought legitimacy for information disclosure and corporate actions from the stakeholders.

The empirical study by Strauss, Kristandl, and Quinn (2015) on the impact of cloud technology on (management) accounting. The survey involved 139 persons from Germany’s WHU Otto Beisheim School of Management. They found that cloud technology-enabled SMEs to make improved decisions and minimize costs.

3. Challenges to Accountants in the 21st Century

The challenges faced by accountants in the present 21st century are reflected in their level of adaptation to the rapid technological transformation that has revolutionized business practices and processes without deviating from fundamental accounting rules and principles (Gulin *et al.*, 2019). Thus, despite the potential for transformation caused by disruptive technologies in this digital era in the accounting profession, these technologies pose potential problems which may be related to technical and moral challenges (Pan & Seow, 2016; Zhao & Atkins, 2021). Gulin *et al.* (2019) further identified some key challenges including the following the use of cloud computing platforms, the application of big data to financial accounting or reporting, Artificial Intelligence (AI) technology, blockchain technology and the use of data analytics. The issue of data and cyber security is very crucial in the industry 4.0 era and poses a challenge to modern-day accountants (Stancheva-Todorova, 2019).

Table 1. Digital technology trends and actions needed from accountants

Digital Technology trends	Actions
Mobile platforms	▪ Evaluate implementation risks

and Cloud-based technology	<ul style="list-style-type: none"> ▪ Evaluate the cost-benefit implication of implementation ▪ Identify preferably solutions that work far into the future ▪ manage the transition to cloud-based technology or mobility in a consistent and safe manner ▪ consider the effect of relevant national and international tax regulations and complications ▪ to outsource demand more granular use of, and price data from, cloud vendors – particularly infrastructure providers ▪ potential offered by an interconnected internet of things, from mobile devices to appliances, cars, and industrial equipment
Digital service and payment systems	<ul style="list-style-type: none"> ▪ acquire relevant skills or recruit new employees with the requisite skills ▪ utilize the experience for innovative developments and adapt to emerging payment platforms ▪ plan “tactically and strategically” on delivering on competitive advantage ▪ consider the implications to other stakeholders and guidance on areas such as online and virtual payment systems ▪ analyse the tax effect
Augmented and Virtual Reality	<ul style="list-style-type: none"> ▪ explore new ways to attract talent and deliver and access training ▪ develop new approaches to measuring and analysing costs and return on investment ▪ consider new ways to conduct business/enhance services by applying augmented reality

Source: Adapted from ACCA (2013)

Therefore, for accountants to adapt to these new technologies (Pan & Seow, 2016) require them to make ethical choices (Zhao & Atkins, 2021). Thus, accountants need to apply professional judgment which is consistent with the notion of having an independent mindset in order to maintain objectivity (Brand cited in Kang, 2016). This implies that they should have the requisite financial expertise. There is also an increased reputation risk from loss of sensitive data to information hackers which could be from external or internal persons. Some of the greatest frauds in history have originated from data leaks.

The use of social media such as Facebook and Twitter can be leveraged for information disclosure or feedback (Manetti & Bellucci, 2016; Bellucci & Manetti, 2017) or as a medium for “fake news” (Zhao & Atkins, 2021).

However, spam and malware attackers take advantage of a social media frenzy to launch insidious attacks (Jang-Jaccard & Nepal, 2014). The report published by Sophos revealed an alarming rise in social media attacks with over 60% of users receiving spam. And the ability to obtain confidential information of the employee corporation. The use of blockchain technology can aid the dual purpose of accuracy and secrecy likewise visualisation which can obfuscate (Zhao & Atkins, 2021). However, the incorporation of robots and other AI systems still requires the human intuitive skill which is necessary for soft-decision (Cohn, 2016).

The Association of Chartered Certified Accountants (ACCA) and the Institute of Management Accountants (IMA) 2013 report predicted that the accountant of the 21st century will be transformed into a hybrid professional, from the interaction of accounting, finance, information and communication technology skills and competencies (ACCA & IMA, 2013). Therefore, the accountant in a technology disrupted environment requires specialist knowledge to be able to monitor the robots, AI, bots, and drones (Appelbaum & Nehmer, 2017). This is essential to maintain the integrity of the data or adjust programming algorithms. In the current context, accountants need to acquire new skills and knowledge on the use of AI in the business environment (Gulin *et al.*, 2019).

The following range of skills are needed for accountants in today's workplace: critical thinking, flexibility, interpersonal skills and ability to collaborate across different functional disciplines, problem-solving and adaptability (David, 2015; Gulin *et al.*, 2019; Marcello *et al.*, 2017; Parham *et al.*, 2012). According to Stancheva-Todorova (2019), modern-day accountants should familiarize themselves with the legal and tax implications caused by the application of cloud-based and digital technologies.

Accountants in smart factories need to work closely with data analytics (Gamage, 2016), the initial goal focused role as preparers of historical financial figures will be revolutionized in a bid to understand business models and understanding the voluminous amount of data at their disposal for effective decision making (Stancheva-Todorova, 2019). The knowledge and competencies of accountants are crucial to coping with the challenges of Industry 4.0 (Stancheva-Todorova, 2019). AI despite its predictive capability to support decision-making presents the challenge of the increasing “number of regulations that need to be transformed into if-then rules and decision trees suitable for AI algorithms” (Stancheva-Todorova, 2018). Therefore, a pertinent question is what are the skills required of accountants to understand and implement AI technologies.

Thus, therefore, calls for a revamping of the current teaching content and quality of accounting students in developing countries and emerging economies that utilize such technologies. In the study by Tan and Laswad (2018), they found a need to incorporate personal and interpersonal skills in accounting curriculum development has re-occurred as the most desired skill for 21st-century accountants.

The profession also needs to modify and develop standards and guidelines (Lombardi *et al.*, 2021) which match the rapidity of growth in technological advancements to ensure best practices and information assurance (Appelbaum & Nehmer, 2017). As stated by Dimitriua and Mateia (2015), financial reporting standards should be adapted to reflect changes that occur from cloud-based accounting.

Lastly, 21st-century accountants need to consider the tax implications of the technological revolution or Industry 4.0. these include such as intragroup transfers, withholding tax, value-added tax, customs duties, international tax rate differentials, etc. (KPMG, 2016; Stancheva-Todorova, 2019).

4. Summary and Conclusion

The conceptual paper concludes that disruptive technologies have the potential to transform the accounting and reporting process in this digital era. It is expected to have a differing impact across different accounting facets from social media reporting to big data analytics over the next few years. The previous lag reporting style will be replaced by spontaneous reporting as AIs are capable of handling large volumes of data simultaneously. The Internet of Things (IoT) has also enabled the implementation of cross border accounting, online accounting and the outsourcing of accounting functions. The impact would also be felt in the education system as the curricula and teaching pedagogy change to accommodate the growing trend of digitalization. This requires a new breed of accountants that understand the current trends and are also able to mitigate the risks that arise from the digitalization of accounting processes.

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