

ARE ACCOUNTING EDUCATORS READY TO EMBRACE THE CHALLENGES OF INDUSTRY 4.0

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Abstract: Industry 4.0 is changing the structure and scope of accountants' qualification profile by imposing new challenging requirements regarding their skills and competences. The paper is inspired by the increasing digitalisation of businesses and the impact of technology innovations and their augmented application on the accounting higher education. The aim of the research is to outline and discuss the challenges for accounting educators due to the required knowledge and skills from graduates in the Industry 4.0 context. A special attention is given to the need for building strong and effective communication and information links with the business partners and professional bodies. The benefits for universities of becoming part of clusters are also discussed in more details.

Keywords: INDUSTRY 4.0, FUTURE ACCOUNTANT'S PROFILE, ACCOUNTING EDUCATORS, CLUSTERS, BENEFITS

1. Introduction

Industry 4.0 is changing the structure and scope of accountants' qualification profile by imposing new challenging requirements regarding their skills and competences. To feel comfortable in the organisation environment of “the digital enterprise” and perform successfully their job tasks, accounting experts should transform into hybrids with interdisciplinary knowledge and plenty of diversified skills and abilities. This interdisciplinary expertise should be reflected in their professional education and training. Many professional accounting bodies as the Association of Chartered Certified Accountants (ACCA), the Institute of Chartered Accountants in England and Wales (ICAEW) and the Chartered Global Management Accountants (CGMA) have already started to change their qualification modules content by introducing information technologies and data analytics into the syllabi. Accounting educators are also experiencing high pressure to enhance the technological content of accounting courses. Programmes' curricula and modules' syllabi should be adapted and continuously linked to the changing labour market requirements and employers' expectations from graduates.

The paper is inspired by the increasing digitalisation of businesses and the impact of technology innovations and their augmented application on the accounting higher education. The aim of the research is to outline and discuss the challenges for accounting educators due to the required knowledge and skills from graduates in the Industry 4.0 context. A special attention is given to the need for building strong and effective communication and information links with the business partners and professional bodies. The benefits for universities of becoming part of clusters are also discussed in more details.

2. The knowledge and skills profile of Accountant 4.0

Due to the increasing impact of Industry 4.0 drivers, one of the most important issue when discussing the interdisciplinary skills and competences required from accountants in “the factory of the future” context, is the identification of the missing knowledge and abilities that should be acquired or developed from the profession. To manage with the missing expertise, accounting education and professional training should be adapted and continuously linked to the changing labour market requirements and employers' demands for qualified human resources.

The knowledge and skills of the future accountants performing the finance function in “a digital enterprise” are depicted on figure 1. The so presented profile is also relevant for the accounting practitioners, who should adapt their business models and accounting services to the challenges of Industry 4.0 [1].

We will discuss in brief few of the skills and competences required from accountants working in “the factory of the future”.

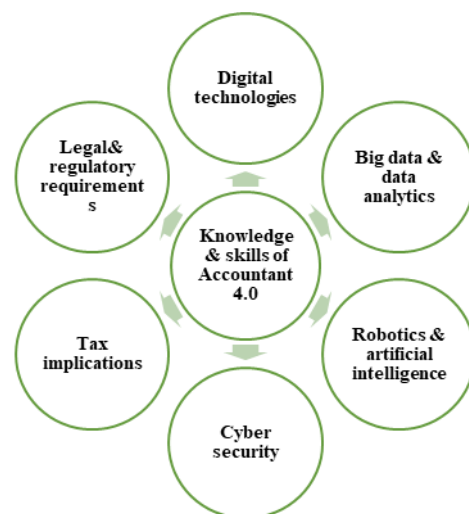


Fig. 1 Knowledge and skills profile of Accountant 4.0 [2]

Development of digital skills in the technology-rich environment of “the factory of the future” [3] is crucial for accounting professionals, who should become experts in mobile technologies, modern tools for social collaboration, cloud computing, digital service delivery, blockchains, augmented and virtual reality, etc. Mobile technologies are revealing new ways for communication and collaboration within and outside the company. Combined with cloud services, they could provide a permanent access to company's financial data for the benefit of the management. New customers could be also attracted despite the geographical boundaries thus increasing clients' satisfaction from services performed. Social media is now heavily exploited by businesses for enhancing collaboration with customers. Social platforms as Facebook and Twitter are used as effective tools for fast distribution of company's data among its stakeholders. According to a survey, performed by ACCA [4], there are few benefits for accountants as improvement of the decision-making and productivity, new investment opportunities, the time-saving for the month-end processing. Accountants should adapt their work performance patterns to this new environment and pay special attention to the risk of sensitive data leakage, different financial implications and the more strategic role of the finance function within organisation.

Another driver for transforming accounting services in practice is the cloud-based accounting software as it is changing the traditional way of “keeping the books”. The document flow and processing and the time for recording of business transactions and

data storage could be optimised. Cloud accounting is providing many opportunities for expanding services offered, realising efficiency gains and extra profits [5]. In fact, it is a powerful tool for strengthening the relationship with clients, gaining a real-time access to company's financial information. Accounting practitioners could transform into virtual financial directors and take the leading role in the strategic planning of their clients' businesses because of their greater business insights and awareness. Through the delivery of digital services, they can improve their own practice - customers will be provided with an easy access to company's statutory and management reports, daily operations will be facilitated, and efficiency and client satisfaction significantly improved. But the successful digitalisation of the business models requires relevant digital culture and skills. Accountants could benefit from innovations and technological breakthroughs only if they would be able to choose and implement the right ones with the most potential for accounting service improvements and business expansion.

The skills associated with the blockchain technologies are also related to the required digital literacy from the future accountants. The new payment systems and the usage of virtual currencies are irrevocably changing the traditional concept of money, methods of exchange and the existing business models. Cryptocurrencies offer a potential for development as the accounting firms could expand their business advisory services and the profession could develop new specialisations. The first mover advantage could be exploited by offering services that meet the tax and other legal regulations as anti-money laundering and counter-terrorism financial rules. On the other hand, accounting regulators and standard setting bodies have to consider the impact of cryptocurrencies and blockchain technology on companies' accounting and financial reporting and develop an adequate regulatory framework to ensure reliable and transparent information for users [6].

Data analytical skills are one of the keys for the successful career of accountants in the data-driven organization. Accounting experts could contribute to the improvement of the decision-making, risk management and strategic business solutions of the companies as the big data sets could provide new insights on businesses [7]. The profession should be well equipped with new job skills for managing the data to be analysed and audited. Data quality and security is an issue requiring special knowledge and competences. The professional bodies and accounting educators are challenged to build such skills through proper education and training of their graduates [8], [9]. ACCA, ICAEW and CGMA have already introduced information technologies into their syllabi [10]. ACCA exams in Business Reporting and Strategic Business Leader introduced Big Data, disruptive technology and cyberattacks through various business scenarios. CGMA has also added some material on Big Data analytics in their 2015 syllabus [11]. On the other hand, accounting educators are also experiencing high pressure to enhance the technological content of accounting courses.

Accountants also need some new skills associated with robotics and artificial intelligence technologies to benefit from their deployment and create more value to the company. One of the most required skills is the technical expertise in machine learning and the depth of knowledge depends on the organisation's size, investment policy and innovation strategy [12]. It is important for accountants to understand the significance of quality of the data used. Internal control procedures should be implemented to mitigate the risk associated with the inherent biases and other limitations of artificial intelligence applications.

By using capabilities of the intelligent systems, accounting experts will be able to support decision-making by providing better and cheaper data, provide more profound analysis of data and give new insights on business. They could focus on more valuable tasks after freeing up working time due to artificial intelligence applications [13], [14].

3. Industry 4.0 challenges for accounting educators

Accounting academics are now more than concerned about the future of the accounting higher education as its patterns are changing as a result of the increasing influence of "the forth industrial revolution". The knowledge and skills profile of the future accountant is a real challenge for the accounting educators as they have to prepare graduates for the new requirements of the labour market. Accounting programmes should become interdisciplinary with teaching content delivered from different departments [15]. Accounting academics have to develop plenty of diversified skills and abilities in students and to take the lead in this academic cooperation. For instance, the insight from faculty shows that there are few very successful practices of implementing Big data competence into the accounting curriculum. One of the pioneers among universities, the School of Accountancy at the Rawls College of Business, Texas Tech University, has already included several core and elective modules on data analytics in the accounting curriculum [16]. St. Mary's University's Greehey School of Business opened a new Bachelor of Business Administration degree program in Accounting and Data analytics. To meet the employers' demand and following the best international practices, the Faculty of Economics and Business Administration at Sofia University "St. Kliment Ohridski" opened a new master program in Accounting and Big Data Analytics. The interest in the programme is increasing as shows the growing number of applicants as well as the support from the business partners of the Faculty. The latter started to provide real case studies to be implemented into the curriculum and to look for business solutions working in collaboration with students from the master programme. The cooperation with the business world is expanding which we consider as an inevitable process in the era of "the fourth industrial revolution".

Professional accounting bodies will play an important role in the process of adaptation of universities to the challenges of Industry 4.0. They have already started to change the content of their professional qualification modules by introducing information technologies and data analytics into the syllabi. Universities with bachelor and master programmes in accounting, accredited by professional organisations, have to revise their curricula and enhance the technological content of accounting courses in order to retain the exam exemptions of the corresponding professional qualification. The support from the accrediting organizations is vital for universities to meet the challenges of the increasing digitalization and technologisation of the business world and to adapt their programmes to the continuously changing requirements of the labour market.

4. Universities participating in cluster partnerships

According to one of the recent definitions, a cluster is described as "the regional conglomeration of companies that are active along a common value chain, including the manufacturers, service providers, suppliers, primary customers, research institutes, universities and other institutions..." [17, p. 15]. The benefits from the cluster partnerships are associated with the networking, access to the skills and abilities of qualified workers, easy interaction of scientific with industrial community, access to specific and expensive infrastructure, know-how, etc. Cluster structures improve business environment and cost efficiency, increase investments in the region and shorten the distance between producers and their customers. Moreover, they stimulate technical innovations and have a positive impact on technology development [17]. Hence, clusters could be considered an integral part of the Industry 4.0 landscape and a driving force for the manufacturing industry.

"The fourth industrial revolution" is reshaping the existing economic structures thus giving universities an opportunity to play a new and important role in the local and regional economic

development. The author is convinced that not only technical universities but also universities, offering programmes in Accounting, could become members of technology clusters and benefit from such membership. There are many emerging issues in the field of accounting, financial reporting and taxation stemming from the Industry 4.0 implications on businesses. Such issues may not be covered by the generally accepted accounting principles and may divert from the common accounting practices. Their solutions require theoretical background, scientific thinking and an interdisciplinary approach, a combination of knowledge and skills that could be successfully provided only by academics.

There are few benefits for the accounting higher educators to participate in clusters. They are summarised in table 1.

Table 1 Benefits for universities, participating in technology clusters

• Access to real case studies that could be implemented into the accounting modules to increase their technical content
• Increase and improvement of practically oriented research through publications on "hot" topics from the accounting practice
• Bridging the gap between accounting education and accounting practice
• Improving the image of the university

There are some prerequisites for an efficient and effective collaboration within the cluster partnership, presented in table 2.

Table 2 Prerequisites for an efficient and effective collaboration with the other cluster partners

• Creating an adequate business environment within the university, including a special administrative unit within the organisational structure, if needed
• Hiring a staff with the proper knowledge and skills to manage and administrate the business communication and collaboration within the cluster partnerships
• Training the academic staff how to build and sustain an effective work relationships with other cluster members
• Building the required technological infrastructure - well-equipped computer labs, possibilities for a remote access to cluster partners' information systems and data basis, etc.
• Developing and regularly reviewing the university internal policies and control procedures on data privacy and security to mitigate the risk of sensitive personal and business data leakages

Beside the positive side effects for universities, participating in technology clusters, there are unquestionable benefits for the other cluster members. Some of them are listed below:

- Access to the knowledge and skills of experts from the academia
- Cheaper solutions of accounting, financial reporting and tax issues compared to the traditional use of consulting services, external for the cluster
- Attracting academics for providing internal trainings for other cluster partners
- Attracting successful graduates and talented students during their study at university

5. Conclusion

Despite the challenges of the expanding digitalisation of businesses and exponentially growing technologies, universities have to embark the road to Industry 4.0 with confidence. Through the constant revision and adaptation of their curricula and syllabi to

the new requirements of the labour market, accounting educators could seize the opportunities of "the fourth industrial revolution". Bachelor and master programmes in accounting should become interdisciplinary, with an enhanced technological content.

Professional accountancy organisations have to support universities in the turbulent era of "the digital enterprises" providing them with surveys, guidelines, teaching materials, train the academics workshops, etc. Academics are required to prepare students for a successful career of the future accountant – a hybrid with interdisciplinary knowledge and plenty of diversified skills and abilities

The academia and industry could both benefit from cluster partnerships. Emerging accounting, financial reporting and tax issues, associated with the Industry 4.0 implications on businesses, could find their proper solutions within the cluster members collaboration.

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