

ARTIFICIAL INTELLIGENCE AND JOBS' FUTURE PROSPECTS IN ACCOUNTING AND FINANCIAL AUDITING

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Abstract: *Despite all controversies, the Artificial Intelligence (AI) continues its course in becoming more and more present in our world, with a huge perspective on modelling it. Using its capacity to assist various processes, it becomes a strong support of increased productivity being also perceived as a threat for jobs, professions and society as well. The aim of this qualitative research is to explore the how AI is perceived as impacting on jobs, and about future jobs' prospects in accounting, and financial auditing. We conducted a summary recent literature review regarding AI increasing use in audit and accounting. As existing hundreds of published papers on AI robots and human labour interaction, in the purpose of selecting relevant literature and for reaching to the mainstream consensual conclusions, input from three AI bots was used, as paper further describes. This paper is structured so readers may follow and further debate this issue around three research questions: are accounting, and financial auditing suited to be assisted by AI, what about existing jobs in this phase of AI usage, and what should happen next with professional's jobs as long as AI keeps spreading and developing? Conclusions of this explanatory – predictive research are aimed to support future accounting and financial auditing related educational initiatives in the context of AI development and pervasion, but also future research on more detailed aspects of interrelations with human increasingly adapted work.*

Keywords: *artificial intelligence; auditing; accounting; automation, human labour.*

JEL Classification: *M42; C87; H83.*

1. INTRODUCTION

AI has come a long way from science fiction stories in the last century to its capabilities now. Starting with ChatGBT, and its worldwide spread through Internet, AI quickly became a matter of public curiosity, debate and concern as well. Once it

became more communicative, AI could be tested and recognized for its benefits by hundreds of millions of people, both excited and concerned about what generative AI could become in the next period. Public reactions are diverse, from acceptance and use in day – to day work to denial and banning as effect of lack of appropriate domain regulation. Irrespective of the general public or administration opinion in AI related debates facts are for sure: there is a sound increase of number of AI related patents, of AI related investments and also number of AI related research, especially in the last ten years, US, Europe and China leading the global competition with more than a half of AI development related initiatives and investments in various domains. As stated in the Stanford University AI 2022 annual index (Zhang D., et al., 2022) the number of patents granted in AI related applications is about 24,000 in 2021 (39.59% US, 7.56% EU and UK, 5.9% China). According to the same source, global corporate investment in AI increased between 2015 and 2021 from 14.99 to 176.47 billion USD and in startup activities from about 10 to 93.5 billion USD in the same period. Considering this trend, the AI started to play a significant role in changing social environment and economic sectors, being felt in the last decade as increasingly participating in peoples individual and professional lives. As a part of economy, financial audit cannot stay aside from these new AI related tendencies. New developments are changing the profession, combined business intelligence and expert systems are now used to improve auditor's work, in terms of time, cost, accuracy and reliability. AI pervasion in accounting and audit (Zakaria, H. 2021), reveals new perspectives for profession, as long as auditing programs are more spread and more sophisticated in testing: transaction, account balances, internal control, selecting and selecting samples, performing analytical tests.

2. LITERATURE REVIEW

According to (Zhang D., et al., 2022) a large number of publications are presenting researchers conclusions on AI, reaching in 2021 at 334.500 written in English, most of them in journals and conferences. Domains are mostly pattern recognition, machine learning, computer vision, algorithm and human – computer interaction, the last being treated constantly in the last years, starting from about 5000 publications in 2015, constantly increasing to 9700 publications in 2021. Human labour displacement by AI, has been largely studied, discussed and generally accepted. From the thousands of published papers, we selected some that models the AI impact on human labour displacement, concluding on ways to manage the impact: education and specialization.

For example, human labour displacement was the conclusion of a very recent Goldman-Sachs Economics Research paper (Hatzius J., et al., 2023) and presented

as an advantage in increased GDP. Estimated human labour shortage as effect of automation is estimated as 300,000 full time jobs, only in the US. The alteration of job skills demand by introducing computer work was earlier studied (Autor et al. 2003) and the conclusion was that so called computer capital may displace workers in performing cognitive and manual tasks that can be accomplished by following explicit rules and also complements workers in performing nonroutine problem-solving and complex communications tasks. The article presented model developed by using data on task input from 1960 to 1998 may explain labour demand shift in favor of employees with increased education (college) in the same period, as long as nonroutine tasks demanding flexibility, creativity, generalized problem-solving capabilities and complex communication could only be complemented by the AI. In another study, (DeCanio S.J., 2016), referring to the technological unemployment, as Keynes defined it almost a century ago, by adapting existing model of Houthakker (The Pareto Distribution and the Cobb-Douglas Production Function in Activity Analysis) proposed a model of production function depending on labour, robots (AI) and ordinary capital. He reached to the conclusion that if the elasticity of substitution between human and robotic labour in general is greater than 1.9, an influence on wages may be perceived. He concludes also that in the manufacture even a smaller elasticity may result in declining wages as robots proliferates. Workers have different levels of qualification, and some conclusions were added furthermore (Aginon P. et al, 2021), investments in robots are associated with shrinking employment for mid-skilled workers, but with increasing employment for low-skilled and high-skilled workers, notably managerial activities, as increased productivity leads by the way of increased profits to firms' development and expansion, so more activities are to be deployed and more labour force is thus needed. Increasing workers competencies is one of the conclusions of another research of the same authors (Aginon P. et al, 2020), suggesting so a supplementary training, targeting improving competencies of those who may be affected the most by the introduction and expansion of AI in manufacture enterprises. The same opinion on human labour displacement by AI robots in industry is comprised in another study (Jung J.H., Lim D.G., 2020) concluding that extensive use of industrial robots tends to suppress employment growth, confirming the labour-substituting effect by industrial robots; but in this study, complementary the conclusion of (Aginon P. et al, 2021), the researcher observed that labour displacement trend tends to affect more low-skilled labour. Nevertheless, markets are not infinite and increased productivity and profits superposed to reduced wages determined by technology development, started to arise concerns about social and economic interactions between winners and losers, at both local and global levels. In a relevant study (Korinek A., Stiglitz J.E., 2018) the

authors insist on the fact that progress in AI is more likely to substitute the human labour, or even to replace workers outright than to simply complement some tasks or jobs. With this perspective benefits of entrepreneurs, as AI owners or users, considered as windfall gains should be redistributed in some way to workers having diminished wages as effect of introducing and development of AI, otherwise the authors foresee resistance to AI from the society who are losing. In fact, they conclude that missynchronization of AI with development rapidly, with economy and society which are changing in a slower pace, may be adjusted by the proposed model of gains redistribution. In later research (Korinek A. et al., 2021) the perspective is changed to a worldwide level, where AI is used mostly in some developed states by some so called “superstar firms” that are superprofitable arising profits from a monopoly position deriving from the own nature of this new technology whose algorithms are trained the most by using the large amount of data they acquired in time. This becomes a risk for emerging countries and economies, as the countries leading in the advance of AI reap most of the gains, displacing human labour from emerging countries whose economies are defined by exports of goods. According to researchers’ conclusions, a crossborder mechanism redistribution of AI generated gains should than put in practice, and a new model of economic analysis should be used to describe the next 50 years of a new economy, dominated by AI and R&D. Analyzing data published on private investment, in the (Zhang D., et al., 2022), it can be easily identified where and who the biggest AI players are: the US, China, the EU, India and the UK. According to the same source, figures of 2021 on private investment in AI show a consolidating position of the three first players.

Being left behind, the EU sets as objective to gradually increase investments in AI to €20 billion per year in the course of this decade. According ECA (press release March 2023), less than 8% of EU firms are using AI, in a large interval from Denmark (24%) to Romania (1%).

As for accounting and auditing, (Hasan A. R., 2022) realized an up-to-date literature review available online, concluding that AI fits everything that can be turned up into data, and those related activities will be eventually taken over by the proper AI technology. Prospects of accounting profession are mentioned by (Hasan A. R., 2022) citing (Griffin O., 2019) as accountants have 95% chances of losing their jobs as machines take over the number crunching and data analysis. Far from being alarming, the study conclusion is on adaptability, on the need on re-skilling, as long as predicted evolutions in AI use will modify the existing labour landscape. We also note that lack of some accountants’ digital competencies mentioned in (Grosanu A., et al, 2022) and (Tiron – Tudor, A et al, 2022) might create major readjustment problems as long as AI pervades firmly accounting and audit's environment.

3. RESEARCH METHODOLOGY

This exploratory study is based on literature review of multiple researches, on information provided by AI bots, and on the author's observations. All these were oriented for answers to be formulated at the following research questions:

Is financial audit as a whole suited to be assisted by AI?

What about existing jobs in this phase of AI usage?

What should happen next with professional's jobs as long as AI is continuously spreading and developing?

Being largely qualitative, and subjective by its own nature, this study is based on observation and interpretation of early research conclusions on the above-mentioned aspects, as confirmed in some aspects by bots' responses.

In a theoretical approach, the study conclusions could build cases for further debates and new researches, as this paper objectives are to observe, interpret and to raise in debate the how use of AI will change financial audit as we know it today.

4. RESULTS AND DISCUSSIONS

As an interesting general study conclusion (Autor D, 2016), AI introduction and development induces both complementarity with, but also human labour displacement, pushing forward peoples for new specializations in supporting AI. Some say that AI usage may come with pressure on reduced wages or even job cuts. In the last decade AI impacted the US audit firms not by cuts of jobs, but acted as a cathalyst to more specialists with new competencies.

Impacts of AI in accounting and audit are presented below for each of the instances the three research questions are referring to, conclusions being presented in the dedicated section as answers to the three mentioned questions.

4.1. Financial audit and AI.

As the Stanford University AI 2022 annual index states (Zhang D., et al., 2022), AI has been significantly adopted in service operation for Business, Legal and professional service and also financial services as well, with an adoption rate from 26 to 40%, meaning the AI bots are undoubtedly pervasing these industries. In this context, it seemd normal to ask a bot about general opinion on AI impact in auditing and accounting. By consulting Consensus bot, a meta-analysis conducted (Berdiyeva O, et al. 2021) on a database of 150 relevant papers published between 1989 and 2020 reveals itself, with a conclusion illustrate a strong positive effect of AI systems in the accounting and finance. The authors states that through their conclusions, most

studied authors agreed about increasing efficiency in the accounting process by adopting AI systems. The study found a positive effect on accounting performance while using AI. A consensus is so being recorded about the suitability of AI to financial audit. For instance, in (Abukhader S. M., 2020), citing (Siegel and Shim, 2010) a number of at least 53 tasks can be automated, and, as the qualitative study of (Abukhader, S. M., 2020) concludes, these tasks are perceived by accountants as suited for automation in different degrees. A similar conclusion was underlined by (Kokina J., Davenport T. H., 2017), after they decomposed audit tasks and identified among them the most structured ones. Their conclusion was that from identified 332 audit tasks representing six audit phases and 50 subphases, 131 (39%) are structured, so may be automatised. They concluded so that “Auditing is particularly suited for applications of data analytics and artificial intelligence because it has become challenging to incorporate the vast volumes of structured and unstructured data to gain insight regarding financial and nonfinancial performance of companies. Also, many audit tasks are structured and repetitive and, therefore, can be automated.” In another qualitative study, auditors’ perception of the AI systems type (Assisted, Augmented, and Autonomous) contribution to audit quality has been examined (Albawwat I., Al Frijat Y., 2021). Conclusions were that Assisted and Augmented AI systems were better received than Autonomus, the last being indicate in the on-line questionnaire as complicated to use.

By consulting a bot, the most relevant conclusion may be extracted on auditor’s tasks that may be authomatized by AI bots and compared with (Abukhader S. M., 2020) conclusions, also citing (Siegel and Shim, 2010). Being questioned ChatGBT at 18th of April 2023, it indicates that several human activities related to audit are suited, according to its knolledge, for automation through the use of AI: data extraction and analysis, risk assessment, fraud detection, sampling, document review, compliance testing, adding short descriptions on what AI can do on these examples. The bot further indicates that AI platforms could help also auditors in performing analysis, such as: financial statement analysis, transaction testing, inventory testing, accounts receivable and payable analysis, offering also here a short description on AI intervention. The data returned by ChatGBT is consistent with the conclusions of previous presented papers (Abukhader S. M., 2020), and (Siegel and Shim, 2010). Development and deployment of bots in audit and accounting is an ongoing process, the use of automation and technology increased over the past decade, many firms starting to use bots and other tools to automate routine tasks and improve the efficiency and accuracy of their work. These tools have been developed and refined over time, and their use continues to grow as firms look for ways to improve their

activities. Being questioned about existing bots in audit, ChatGBT delivered some examples: KPMG's Clara, EY's Helix, PwC's Aura, Deloitte's Argus, EY Tesseract. Development and deployment of bots in audit is an ongoing process, and it is expected that this will follow the general pace of the AI industry, associated with increased concern on AI ethics, meaning data privacy, confidentiality, automation bias and accountability. As a response to these, IFAC published in 2022 some supporting materials stressing on the fact that auditors should continuously respect the ISA, and should keep their professional skepticism, for example by asking themselves and the beneficiary how a new implemented AI platform works, the nature of the activities it performs and if it was sufficiently tested, or if it is fit for the activity is used for.

4.2. Influence of AI in accounting and auditing existing jobs.

Lots of predictions are made about human work displacement once with extending AI platforms in accounting and auditing. Some estimates (Frey C., Osborne M., 2017) shows 94% probability that AI will automate these jobs in the near future. Auditing profession exposure to AI is significant, but according to some studies (Law K., Shen M., 2020) citing (Brynjolfsson et al., 2018), auditing is in the bottom 20% of 964 occupations suitable for machine learning devices.

A consensus exists that AI is impacting audit and accounting activities, but in what extent is clear only about the past. A recent study (Fedyk A. et al., 2022) using a dataset comprising more than 310,000 resumes for the 36 largest audit firms in the US revealed that in the period 2010 – 2019 the total number of audit firms' employees doubled from 151,352 to 310,422. The accounting employees share decreased in the same period from 35,52 to 31,98% of total, as long as the share of AI specialized employees increased from 0.08 to 0.37%. It can be observed that in the 2010 – 2019 decade the need for accounting (tax and audit) decreased with 11% but the need for AI specialists in audit firms increased continuously up to 462%. A significant increase is of share of consulting employees from 19.87 to 27.66%. Study's conclusions on labour effects on AI adoption are that AI is decreasing human error, while increasing the number of clients that can be handled by an auditor, from 3 to 10. Introducing AI allowed audit firms to increase accounting employment in the same decade, as maintaining approximately the same number of audits annually. Nevertheless, the number of accountants increased in the industry with more than 45,000 people, representing 28.61% of the total employment in audit firms during the period 2010 – 2019. We may then conclude that introducing AI meant for the decade increase employment especially in AI related fields and other specialists, and also for accountants, seeing a tendency of reducing share of new employed

accountants in favour of other specialists and AI specialists. We also need to note that since automation is not an enemy of employment, it may pose a greater challenge for income distribution (Autor D. 2016).

4.3. AI impact on future developments for jobs in accounting and auditing

As we did before in this paper about AI implications in auditing, we searched for a bot opinion in the matter. Inspired by the (Frey C., Osborne M., 2017) model, a dedicated bot enthusiast delivered an instrument of estimation available online at: <https://willrobotstakemyjob.com>. Here, a pole is feeding the machine learning system which trains a model having an R^2 of 0.9193. For assessing the suitability for automation, some attributes fed the system, such as: originality, creativity, persuasion, social perceptiveness, negotiation, assisting and carried for others, coordination, and others for each profession labeled. As it functions at the date of this paper, the bot is offering an image about how the trained and continuously feed AI foresees the future of labelled professions in the US, among them the audit profession. As for auditors, the automation risk level bot returned is 71%, as the polling of more than 5,200 users estimated a 64%. As the two figures are relatively convergent, the conclusion is that auditing faces a significant threat for automation, as many of its tasks may be undertaken by developing AI technology. Some attributes of the profession are yet difficult to automate: persuasion, social perceptiveness, negotiation, originality, these ensuring a future for this profession.

Even if, as the history shows, after a new technology appears some professions may become irrelevant, others will develop later, to support and complement the new technology. Low skilled accountants, responsible with entering data will certainly disappear in less than one decade. As a number of recent studies concluded (Aginon P. et al, 2021), (Autor D. et al. 2003), (Griffin O., 2019), introducing AI will increase the need for more specialized employees, in order to use the new technology, to manage the data that bots can make available for users. Shortage in digitalisation knowledge or avoiding new technologies as (Grosanu A., et al, 2022) and (Tiron – Tudor, A et al, 2022) revealed in their studies, may have only the outcome of accounting and auditing firms' being marginalised and eventually followed by sacking their employees. As (Griffin O., 2019) cites “With more data available, the case load for judgement work is just going to increase. Do we expect repetitive work and jobs to go? We absolutely do. But an increase in AI and consulting work can help our clients to improve their businesses, too” and “There is an expectation of rising demand for accounting businesses data analysts and business consultants in accountancy firms “. There are huge opportunities for making sense of data, whether that’s corporate data or sustainability reporting,””. As another recent study (Fedyk

A. et al., 2022) shows, in the last decade, the number of accountants in audit firms in the US (audit and tax included) increased in absolute figures, but decreased in relative ones in favour of more specialized employees.

However, soft skills, such as intuition, creativity, and communication, remain relevant in today's technological environment, if not some critical. As long as some parts of financial statements are subject to estimates, financial auditors cannot be exempted from audit procedures on such estimates, given their subjective nature. Even if, as AI pervades the profession, the auditor's role is reduced in terms of verification, it will increase about judgment, supervision, and insight. Thus, audits in the new technology's context will focus on systemic evaluation, risk assessment, predictive auditing, and fraud detection (Kroon, N. et al, 2021).

As the bot itself indicates, using the large amount of data it was trained on (ChatGBT), auditors should focus on developing skills in areas such as data analytics, machine learning, and programming languages such as Python and R. They should also gain a deeper understanding of AI technologies and their applications in accounting and auditing. In addition, auditors should learn how to work with AI tools and platforms, and understand how to interpret and analyze the results generated by these technologies. Auditors should also focus on developing soft skills that are important in a data-driven environment, such as critical thinking, problem-solving, and communication. They should be able to communicate effectively with clients, colleagues, and other stakeholders about the use of AI technologies in audit, and be able to explain the results of AI-based analyses in a clear and understandable manner. Finally, auditors should stay up-to-date with the latest developments in AI and emerging technologies, and continuously update their skills and knowledge to remain competitive in the job market. This may involve participating in training programs, attending conferences and seminars, and engaging in other forms of professional development. Academia should play a key role on this, by offering courses and programs specifically focused on AI adoption in accounting and audit, covering both the technical aspects of AI and the ethical and governance implications of its use, by incorporating AI topics into existing accounting and audit courses and programs, so that students being exposed to AI concepts and tools throughout their education, by providing hands-on training with AI tools and software, so that students gain practical experience with these technologies and are better prepared for their use in the workplace. Academia should partner with industry professionals and organizations to provide real-world case studies and examples of AI adoption in accounting & audit and should encourage research and development in AI adoption in accounting and audit, so that it can stay up-to-date with the latest advancements and best practices in the field.

In their study (Kokina J., Davenport T. H., 2017) presented also some ways accountant and auditor should assist the percourse of AI as remained tasks for accountants: “Working alongside intelligent accounting machines to monitor their performance and results, and (if possible) to improve their performance; Overseeing the use of intelligent machines in external and internal audit processes, and determining whether more, less, or different automation tools are necessary; Working with accounting firms and vendors to develop new AI-based technologies, and to support existing ones; Carrying out tasks that are now impossible with AI-based computers, including cultivating internal and external clients, interpreting audit and financial results for senior managers and boards of directors, and so forth; Addressing types of accounting tasks that are so narrow and uncommon that it would be uneconomical to build systems to automate them”.

Going back to (Griffin O., 2019) “AI is what you make it, ... “If you are working in a practice that does a lot of bookkeeping and compliance work then you do need to realise that automation is coming. For some it might be that they are of an age where it doesn’t particularly matter; they have enough clients and work to carry them forward. “If you are a younger accountant coming into the profession you need to understand what’s going on and what’s available to help you work alongside artificial intelligence.””.

Following the presented above researchers and bots converging concusions, we may then also conclude that, correlated with the market demand, the number of skilled accountants in domains as: cybersecurity, data analitycs, forensinc accounting, risk management and fraud detection, using attributes that cannot be yet replicate by the AI, will continue to grow as long as traditional bookkeepers and number-crunching accountants will become history.

5. IN CONCLUSION

As a large-scale process in rapid development, introducing AI bots in various fields is nearly at its beginning, and all information that can be transformed into data will be eventually automatized. This will accordingly apply to audit and accounting, early relevant data being already collected and interpreted by various researches. By this research we found consistent literature conclusions with the data returnd by the bots of Consensus and ChatGBT. The Big 4 embraced AI and are already using their own platforms. Concerns on ethics were lately reveald, so IFAC is assisting auditors by delivering adequate approaches.

Audit and accounting are than fit to AI usage, AI is already there, so spreading AI is affecting and will further affect the profession and jobs. (Conclusion no.1).

Even if a large number of researches are concluding that in general automatization brought by AI bots will displace human labour, as regarding labour in the US audit firms, the facts registered in the last decade shows exactly the opposite, the number of accountants increased significantly, but with much lower share than of other specialists, including AI specialists. This means that in the market, even after AI was introduced, a real need was felt of increased traditional human labour force (accountants) but also a strong need of complementary specialization for accountants and auditors, materialized in new jobs for these new specializations. (Conclusion no.2).

There is no reason to consider there are factors that will disrupt the accounting and auditing activities in the years to come, apart for acceleration in adopting AI. Relatively increased share of other specialists and AI specialists employed in audit firms in the last decade indicates that those firms needed complementary skills, apart from the those of classical accounting, meaning specialization of accountants in complementary fields was expected and will probably be expected in the years to come. Academia has a role to play in preparing existent and future accountants in identified related competence fields by shaping its curricula, in partnership with the continuously evolving industry.

Tomorrow's professionals will have to leave to AI more and more of the present repetitive tasks for new ones, in which will put in value human occupational attributes that cannot be replicate by the AI as its evolutionary stage increases, such as: persuasion, social perceptiveness, negotiation, originality, creativity, empathy, communication, obviously supported by strong digital skills. In this way human labour, acting complementary with the AI platforms will be able to add long term value, to accounting and audit. (Conclusion no.3).

As a summarized conclusion of this paper, we may consider that in the coming years AI will reshape the profession, pushing forward stakeholders to evaluate: accountants and auditors to acquire new and context-appropriate skills, Academia to adjust its curricula to AI pervasion, to deliver new specialization to students and graduates as well, and the regulators to adopt appropriate modifications of the standards and to adopt regulations as response to the identified risks on AI use. As long as economic activities continue, there will also be a need for specialized auditing and accounting services, and in the trend of the last decade, this will mean, as a whole, more specialization rather than less labour or job cuts for accountants and auditors. Wages in the industry will increase as the human labour specialization will assist AI continuous pervasion. Concern for acquiring new knowledge, and continuous specialization will define the future successful accountant, enabling him to keep the pace in assisting AI expert systems along their becoming, from repetitive

task automation, through context analysis and learning, to self-aware intelligence. As regarding concerns about human labour displacement by the AI, we consider that final conclusion of (Autor D, 2016) citing the economist, computer scientist and Nobel laureate, Herbert A. Simon: “The bogeyman of automation consumes worrying capacity that should be saved for real problems” is as valid now as it was when initially stated in 1960.

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