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Accounting Profession and Industrial Revolution Era 4.0: Opportunity or Threat?

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Abstract: The industrial revolution era 4.0 has changed the manual-based to technology-based systems. The automation of financial system in business has shifted the accounting profession. This study aimed to evaluate the impact of industrial revolution 4.0 era whether as opportunity or threat faced by accountant. This study provided a perspective of industrial revolution 4.0 towards the accounting profession and the existing opportunities and threats. This systematic review research used a stage model previously developed by Chitu Okoli. This study used the related articles from various journals. The industrial revolution offers users to possibly change the data and information and companies to become more effective and efficient. Industrial revolution has impacted the number of workers due to the automation in accounting activities. On the other hand, industrial revolution provides various job opportunities in accounting profession. The development of technology still cannot replace the role of accountants, because humans are equipped with emotional intelligence unlike technology. Therefore, various types of technology used in industrial revolution era 4.0 still need the involvement of humans. Anyone with special Accounting expertise and competence will have these opportunities. This study is expected to provide contributions related to the views on opportunities and challenges for the profession of accountants in industrial revolution era 4.0. This study possibly encourages accountants to improve their skills and professionalism, especially on the accounting systems which cannot be completed by machine and still require the involvement of humans

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INTRODUCTION

Industry is part of economic activities of manufacture, both manual and automatic. In the industrial era, technology develops rapidly and causes changes in industrial paradigm called "industrial revolution" (Lasi & Kemper, 2020). These days, the industrial technology develops in the fourth phase. The first phase or industrial revolution 1.0 occurred in 1784, when machinery was used in production activities for the first time (Zhou, 2015). The second phase or industrial revolution 2.0 started in 1870 when electricity was used for the first time in industrial activities, allowing mass production (Iswanto & Wahjono, 2019; Zhou, 2015). The third phase was industrial revolution 3.0, known as digital revolution, starting from 1969, when analog and mechanical/technical activities changed into digital form and programmable logic control (PLC) was used for the first time (Drath & Horch, 2014; Zhou, 2015). The fourth phase started in 2013 with integration

of information and communication technology with industrial technology and Cyber-Physical System (PCS) construction (Zhou, 2015) commonly referred to as industrial revolution 4.0. The industrial revolution 4.0 phenomena does occur and is unavoidable for anyone (Drath & Horch, 2014). Each of industrial revolutions has their own benefits and threats for a country's socio-economic aspects (Morrar *et al.*, 2017). Industrial revolution increases economic growth, productivity and welfare takeoff those making use of it (Morrar *et al.*, 2017). There are, however, other threats and opportunities in industrial revolution. Personal skills and expertise determine whether humans will make use of the opportunities or be affected by industrial revolution 4.0.

Among the most important things of technology is its capability to change information and data and make companies operate more effectively and efficiently (Arnaboldi, Busco, & Cuganesan, 2017; Kruskopf, Lobbas, Meinander, & Söderling, 2019). The benefits offered by the development of technology make companies strive to develop technology. There are reasons that companies develop technology, such as operational cost reduction and production cost reduction, making them generate greater revenue (Frey & Osborne, 2013). IoT is a technology developed by integrating components into a system. With its connected system, IoT allows performing production activities and other corporate activities automatically. Keeping IoT implemented and developed will impact on the number of workers in a company. The more sophisticated the technology used, the less manpower is involved in corporate activities. That employees' role is replaced by IoT, the company will reduce its employees, leading to less production activities with human involvement in engineering and special expertise.

Many jobs are most likely affected by the development of technology (Frey & Osborne, 2013). IoT has changed companies' accounting and accountability even though it does not directly change the function of accounting itself (Arnaboldi *et al.*, 2017). One of the job opportunities to be affected by IoT development is accounting. IoT changes accounting in the following three aspects; reporting and disclosure standards, new form of regulation and threat to accounting profession (M. A. Islam, 2017). Besides, IoT development results in change in companies' business model from manual to automatic (Guthrie & Parker, 2016; Pan & Seow, 2016), including for activities involving accounting personnel. An accountant serves to record transactions, process financial transactions, identify transactions and make AI (Artificial Intelligence) and robotic technology mediated reports (Iswanto & Wahjono, 2019; Sumarna, 2020) while basic accounting activities can be performed with computer aid for higher effectiveness and efficiency without human assistance. Furthermore, this will force accountants and accounting firms to develop mobile applications capable of accessing data directly through mobile devices, tablets and virtual reality (VR). Financial statements audit will be performed real-time, in which regulators and auditors can retrieve the data required automatically and directly from the system and sensor connected to operational activities. Therefore, the transparency and accuracy of the data received data are credible. If accountants do not have sufficient expertise in information technology, other professions may take over their function.

On the other hand, no matter how well-developed a technology is, it keeps requiring humans in and for development and operation. Despite automation of many tasks, humans will create value for clients that technology cannot replaced (Kruskopf *et al.*, 2019). Technological changes create many new job opportunities for those desiring to develop (Kruskopf *et al.*, 2019). Accounting profession can become the decision maker and create a policy based on automatically produced financial statements. In industrial revolution era 4.0, accounting profession should not be involved in automatic operation but focus on financial strategy Ghani and Muhammad, (2019) and decision making in resource efficiency. Automation presents benefits to accounting profession, such as realtime data retrieval, improved data quality to higher accuracy, improved data efficiency and also improved data assurance for the purpose of decision making (Hart, 2017). Decision making requires difficult consideration. Decision maker needs to understand each account and their implication for business finance. Employers greatly expect accounting graduates in the industrial revolution to be capable of applying technology for preparing, reporting and disseminating accounting information (Ghani & Muhammad, 2019).

Frey and Osborne (2013) said that accounting profession in the United States is at risk in industrial revolution era 4.0 that robots do not only perform routine tasks but also sophisticated tasks. Despite threats to accounting profession in the industrial revolution era 4.0, there are opportunities for accountants. This

research aimed to evaluate the role of industrial revolution 4.0, opportunities and threats faced by accountants.

LITERATURE REVIEW

Industrial Revolution 4.0

Industrial revolution 4.0 is everything about smart technology of connecting technology with companies, assets, people and is characterized by analyticity, robotics, technology, artificial intelligence and others (Kruskopf et al., 2019). Popkova, et al. (2018) said that challenges faced in Industrial Revolution 4.0 are that all kinds of machines are to be connected and high dependence on cyber-physical systems that will have the way people live, work and communicate changed. Industrial revolution 4.0 refers to trends related to "digitalization" of economy and society, including development of smart services, cloud technology, smart data, education science, digital science, digital networks, and digital environment (Kartowagiran et al., 2020; Popkova et al., 2018).

There are four main key technologies in industrial revolution 4.0: 1) shift from Cyber-Physical System (CPS) to Cyber-Physical Production System (CPPS) through connecting real and virtual worlds to realize smart production (Zhou, 2015), 2) mobile internet and Internet of Things (IoT) technology (Iswanto & Wahjono, 2019; Sumarna, 2020; Zhou, 2015), in which IoT is not only used for inter-human communication, but also between humans and machines, 3) cloud computing technology (Zhou, 2015), 4) big data and advanced analysis techniques (Iswanto and Wahjono, 2019; Morrar et al., 2017; Sumarna, 2020; Zhou, 2015). Industrial revolution 4.0, IoT plays a role in changing the paradigm of companies. With IoT, there is a system between companies, facilities and machines for real time data sharing and use of smart networks for self-awareness in the system (Burritt and Christ, 2016), thus fewer people are involved in these activities.

Industry 4.0 is implemented in a company aiming at 1) reducing technical errors, 2) improving product quality, 3) avoiding danger in production activities, 4) providing products to consumers timely, and 5) increasing data credibility (Burritt & Christ, 2016). Technology development brings two impacts, namely destructive effect and capitalization, in which more companies enter industrial market (Frey and Osborne, 2013). Meanwhile, there are big benefits offered by development of technology.

To keep the pace in which the existing technology develops, workers are required to take full advantage of digital technology. Individual's abilities in the Industrial Revolution era 4.0 are those for becoming effective workers (Ananiadou & Claro, 2009). (Nuryantini & Mahen, 2018) revealed that the skills needed in the Industrial Revolution era 4.0 highlight the aspect of decision making to deal with daily life problems based on information and digital technology. In addition, workers are required to master the top ten skills of IR 4.0 presented at the World Economic Forum, namely complex problem solving, critical thinking, creativity, people management, coordination with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility (Gleason, 2018). These abilities aim to change the millennial generation's mindset and way of working for their competitiveness.

Accounting Profession

Accounting plays an importance role in business and economy. The CPA Journal projects the growth of accountants and auditors of 10% for the period 2016-2026 (10 years) (www.aicpa.org). The Institute of Management Accountants defines accounting professional as an essential part of financial management, organizational development, and achieving strategic goals. Accounting profession will be asked to assist companies in reporting what the companies have achieved in their effort to support decarbonization (Lovell, et al, 2013; O'Dwyer & Unerman, 2020). In performing their duties and functions, an accountant must comply with and uphold the established code of ethics, namely the Indonesian Accountants' Code of Ethics (Hayati, 2014; M. Islam, 2013; Jakubowski, Chao, Huh, & Maheshwari, 2002; Lukman & Irisha, 2020).

These days, professional accountants are required to have expertise in business transformation, digital strategy, and innovation for them to adapt to technology and digital era (Kokina & Blanchette, 2019; Mosteanu & Faccia, 2020). Technology is used considerably in accounting (Silva, Tommasetti, Gomes, & Macedo, 2020). Technology can help accountants calculate accurately. Accountants need to improve their skills and adapt to changes in avoidance of losing job (Kruskopf et al., 2019).

Technology development gives great opportunities to increase work effectiveness, but also gives challenges to workers, including accounting profession, in adaptation to digital technology (Ghani & Muhammad, 2019). Accountants' professional judgment is still needed that transaction recording is in compliance with the standards (Bennett, Bradbury, & Prangnell, 2006; Mintz, 2011). The rapid growth of digital-based and artificial intelligent businesses will actually open up opportunities for accountants to become company's advisor that they are essentially business communicators (Nielsen & Madsen, 2009; Sinurat, Ilham, & Cen, 2021). Accountants must be ready for future challenges, covering technical knowledge, learning abilities, adaptivity & agility, positive mindset, and resilience (Jackson, Michelson, & Munir, 2020). Accountant is no longer someone working in back office, but is a company's partner and part of company's main support system (Bose, 2002; Linder, 2004).

METHODS

This is a systematic review research. Systematic review is a stage model previously developed by Chitu Okoli consisting of planning, selection, extraction and execution (Okoli, 2015). Literature and previous researches were used to collect information for the research. The first step was planning, start from identification of the objective of the study, draft protocol and team training. This study aimed to examine the role of industrial revolution 4.0, threats, opportunities and future accounting profession. The reviewers made a clear agreement and were trained to execute the review. Selection consists of application of practical screening of and search for literature. The literature was searched from online articles with keywords "accounting profession", "opportunities", "threats", and "industrial revolution 4.0." The literature collected online included 56 articles related to the keywords. The third step was extraction, consisting of data extraction and appraisal quality. The researcher reviewed the articles and extracted any information related to the objective of the study. The 38 reviewed articles were excluded due to quality insufficiency. 18 articles were selected for execution. 56 articles were identified and 18 articles were selected from Google Scholar. The last step was execution, covering synthesizing the study and writing the review. Combined, the articles were written on the research paper, resulting in the overview below.

RESULTS AND DISCUSSION

Role of industrial revolution 4.0

Industrial revolution era 4.0 plays a role for the transformation of accounting profession. Table 1 shows the role of industrial revolution 4.0 according to researchers.

Table 1. Role of industrial revolution 4.0 for accounting profession

Role of industrial revolution	Researcher
Business innovation	Retnaningdyastuti, 2018; Burrirt & Christ, 2016;
Changes in accounting activities	Akhter and Sultana, 2018
Changes in accounting profession	Frey and Osborn, 2013

Industrial revolution era 4.0 is also called the disruption era (Retnaningdyastuti, 2018), which is a condition in which a business is required to keep innovating for it not only to fulfill current needs but also to anticipate future needs (Retnaningdyastuti, 2018). In the disruption or industrial revolution era 4.0, people compete in mastering science and technology. Industrial revolution 4.0 is essentially about the use of technology and the Internet of Things, allowing decentralized connection between machines, products,

systems and humans (Mohamed, 2018). The main components in industrial revolution 4.0 are 1) identification, 2) clear identification of places, 3) cyber-physical system, 4) Internet of Things (IoT), 5) data collection and analysis, 6) Internet of Service (IoS) (Mohamed, 2018). The rapid development of technology brings significant changes in the business world. Business activities are growing more rapidly and companies are competing in creating quality and inexpensive products. This leads to cost reduction of company's production, especially employee salary cost that it is replaced with automation technology. Companies start replacing technical works with automation technology that the data are received data more accurately and real time. In industrial revolution 4.0, the data are more accurate, adequate and real time, making them more reliable for decision making (Burritt & Christ, 2016). Data of good quality will produce right and effective decision, minimize costs and maximize profits for companies. The threats faced in industrial revolution 4.0 are expertise availability and worker qualification, especially accounting which adopt the new system. With the various advantages from industrial revolution 4.0, accounting technical activities (journal entry, bookkeeping, reconciliation, ledger preparation and financial statements preparation) start changing. Activities that are currently performed using software and require human based data entry will gradually change and be replaced with well-structured artificial intelligence technology. Table 2 explains the comparison between accountant profession's current and future activities with regard to industrial revolution 4.0.

Table 2. Accountant Profession's Current and Future Activities

Activities	Current activities	Future activities
Journal recording (data entry)	Transactional operator/accountant	Artificial Intelligence (AI)
Posting into ledger (bookkeeping)	Software	AI
Compliance related works	Software	AI
Gathering documents from clients	Via email	Via email
Preparing payment bill and item requisition	Software for billing and purchase	Machine learning
Preparing ledger	Spreadsheet	Software
Reconciling receipts	Software	Machine-readable data
Performing personal audit investigation	Software for forensic analysis	AI
Preparing tax documents and calculation	Software	Machine learning with specific algorithm
Making financial statements	Accountant with software's aid	Automated annual report

Source: (Akhter & Sultana, 2018)

In addition to activities in changing job position, there are jobs which may be quite likely replaced by technology and automation. Frey and Osborn (2013) predict the possible impacts of industrial revolution 4.0 and automation on various jobs. In business and management sectors, young accounting staffs assigned to do bookkeeping, data entry and financial statements designing are ranked the highest, 693 out of 707 tasks from calculated probabilities. This means that this job is most vulnerable to the impacts of industrial revolution 4.0. In addition, account and bill collectors, bookkeeping accountants, audit staff, auditors and accountants are also likely replaced with automation. Table 3 explains probable impacts of industrial revolution 4.0 on some jobs.

Table 3. Probable Impacts of Industrial Revolution

Rank	Probability	Job
28	0.0055	Human Resource Manager
30	0.0063	Training and Development Manager
61	0.014	Marketing Manager

67	0.015	Public Relation and Fundraising Manager
107	0.03	Industrial Production Manager
152	0.069	Financial Manager
182	0.13	Management Analyst
198	0.17	Financial Examiner
217	0.23	Financial Analyst
589	0.95	Auditor and Accountant
613	0.95	Account and Bill Collector
671	0.98	Audit, Accounting and Bookkeeping Staff
693	0.99	Young Account Staff

Source: (Frey & Osborne, 2013)

Opportunity

Table below shows accounting profession’s opportunities in industrial revolution 4.0 according to researchers.

Table 4. Accounting Profession’s Opportunities in Industrial Revolution 4.0

Accounting profession’s opportunity	Researcher
Decision maker	Akhter & Sultana, 2018; Bruns Jr., 1968; Richins, Stapleton, Stratopoulos, & Wong, 2017; Weber, 2020
Data controller	Kruskopf et al., 2019; Moll & Yigitbasioglu, 2019
Accounting onsultant	Holtzman, 2004
Accounting software developer	Rındaşu, 2017

Accounting plays an important role in business (Goh, Seow, & Pan, 2017). Internal accounting serves to improve decision making, productivity and maximize company profit (Weber, 2020). Accounting is an important source of information for decision making (Bruns Jr., 1968; Richins et al., 2017). Accounting information based decision will affect companies, both on small and large scales. In cost accounting, for example, increased price of raw materials will lead to increased production cost and decreased profit. Therefore, a company must make decision to maintain its profit and production. In this case, cost accounting serves to maintain its profit. In the company’s future growth, accountant’s work will be needed. Recent automation can only to take a few roles of accountants including data entry, bookkeeping, reconciling, ledger preparation and financial statement preparation in a good way and real time. However, despite technology’s ability to provide up-to-date and accurate information, decision makers’ unawareness of the fundamentals of accounting will endanger the company (Richins et al., 2017). Therefore, accountant plays an important role in company’s decision making. Technology has no capacity to replace emotional intelligence, thus humans are greatly needed in decision making that technology is incapable of (Akhter & Sultana, 2018).

Even if many activities are performed by technology for better and faster production, humans still have the advantages in terms of improvisation and imagination in business (Kruskopf et al., 2019). Technology exists to help humans work, not to replace their role. Humans and technology have their respective strengths and weaknesses and complement each other (Daugherty & Wilson, 2018; Moll & Yigitbasioglu, 2019). Humans have the advantage in leading, understanding behavior and culture and making consideration, while technology has the advantage in transaction, repetition, prediction and adaption (Daugherty & Wilson, 2018). If humans collaborate with technology, they can do training, explanation, sharing, strengthening, interaction and realization (Kruskopf et al., 2019). Accountants are needed to ensure that the data and information produced by technology are compliant with the objectives (Moll & Yigitbasioglu, 2019). For example, accounting staff input goods selling data using hand scanner, which are then processed by technology to produce accurate sales report data immediately. The accounting

staff will finally strengthen and turn the data into information for manager or related parties for decision making. These are the collaboration between human and technology.

The development of industrial revolution and automation does not only indirectly pose threats to some job opportunities, including accounting, but also provides accountants the opportunity to increase added value for competitiveness (Richins et al., 2017). The following are opportunities that accountants can take in facing industrial revolution 4.0: 1) administering information technology-based accounting consultancy (Holtzman, 2004). Accountants will compete and develop their consultancy services online, making it more effective and efficient. Online consultancy service has various advantages, such as flexible meeting places and lower cost due to non-required arrival of accountant to the company; 2) developing data security devices in order to minimize data manipulation (Rîndaşu, 2017). Devices with high level of correctness and capability to minimize data manipulation are preferred by investors for investment decision making; and 3) using technology in audit can help increase disclosure of fraud, inconsistency and other errors more accurately (Kruskopf et al., 2019). This step will recover public trust in auditing code of ethics to enforce impartiality and truth in financial statements.

Threat

The table below shows accounting profession’s threats in industrial revolution 4.0 according to researchers.

Table 5. Accounting Profession’s Threats in Industrial Revolution 4.0

Accounting profession’s threats	Researcher
Unprofessionalism	Holtzman, 2004
Globalization	Holtzman, 2004
Graduate’s competence	Goh et al., 2017; Rîndaşu, 2017; Sledgianowski, Gomaa, & Tan, 2017
Relevance of curriculum	Adriana, Amalia, & Utami, 2020; Goh et al., 2017; Rîndaşu, 2017

There are many threats that accountants have to face, even before IoT and digitalization existed in the world. Holtzman (2004) proposes five threats of accounting profession in the 21st century. First, accounting profession underestimates the importance of audit and replaces it with management consultancy. Second, accounting profession is struggling to keep audit function important. Third, accounting profession develops quantitatively, and the number increases uncontrolled. This uncontrolled development leads to obsession with growth and profitability, having professionalism of accounting lower priority. Accounting profession has turned into entrepreneurial business of providing professional services while disregarding professionalism. Fourth, three main audit standards are violated, namely independence, competence and general audit standards. Finally, strong pressure is put by audit service partners, forcing them to sacrifice healthy accounting practice as taking place in Enron case. The cases of unprofessional accounting firms such as Enron, WorldCom and Anderson (Holtzman, 2004) should be taken into consideration by other accounting firms that maintain good accounting practice as their top priority in order to keep public trust in the accounting profession, especially external accountants.

The other threats that accountants will face are globalization and industrial revolution 4.0. Industrial revolution 4.0 in which distance is no longer a constraint will support the foreign outsourcing services trend (Holtzman, 2004). Companies will outsource employees from abroad with lower salary than domestic employees. In case this keeps happening, there will be a possible increase in domestic unemployment, which does not only affect domestic accounting firms but also the government. Foreign outsourcing will reduce income tax that the government should obtain Holtzman (2004) from the company’s country of origin. Government’s role is needed to make business regulation at global level (Arnold and Sikka, 2001; Moll and Yigitbasioglu, 2019) to ensure appropriate and mutually beneficial use of technology.

The threats faced by accounting profession in industrial revolution 4.0 are also faced by education providers. Accounting firms and accounting professional association recommend that through technological developments, educational providers should be capable of producing graduates with required

expertise and knowledge who are capable of adapting to technology development (Goh et al., 2017; Rîndaşu, 2017; Sledgianowski et al., 2017). Current curriculum has actually not been integrated with technology developments (Rîndaşu, 2017). Education providers need to ensure that graduates have the appropriate knowledge and skills to overcome accounting profession’s future threats (Adriana et al., 2020; Goh et al., 2017). Sledgianowski, et al. (2017) propose three competences recommended for accounting educators. First, educators discuss with each other to integrate the accounting competences that accountants must master. Second, educators develop and create strategic plans for accounting programs to be on top priority (big data development or adjustment to accounting professional association). Lastly, educators must implement their prearranged plans. In response to the threats of accounting education in technology development, Lawson, et.al (2014) created a competence-based education framework as follows: 1) accounting education must be oriented towards long-term career goals, 2) accounting education is not only focused on public accounting and auditing, but also other skills needed and developed in industrial revolution 4.0, 3) educational objectives reflect how accountants add value into organization and improve its graduates’ competence, 4) the whole components are developed as integrated competences. In addition, accounting education must teach accounting code of ethics to minimize occurrence of fraud (Andriani & Nugraha, 2018).

The challenges that accountants face in industrial revolution 4.0 are: 1) taking opportunities in every threat such as acquiring expertise and skills needed for digital automation, 2) making changes in appropriate time, 3) transforming certain aspects, 4) adapting to accounting changes related activities (Iswanto & Wahjono, 2019). Finally, the threats that accounting profession faces are not only with regard to recent technology development, but also accountant’s professionalism. Accountants must maintain healthy practice with their clients for stakeholders and the public to trust in accounting profession. Accountants must also improve their skills in information technology, finance and competence of and in industrial revolution 4.0. These skills are needed for strategic management, financial decision making, and financial accounting management based on digital automation data.

In addition, accountants also need to compete and have the expertise needed in industrial revolution 4.0. School and higher education institution need to create competence-based curriculum and produce young accountants with high adaptability to future conditions.

Accountant in the future

The table below shows future accounting profession in industrial revolution 4.0 according to researchers.

Table 6. Accounting Profession in the future

Accountant in the future	Researchers
IT knowledge	Pan and Seow, 2016; Kruskopf et al., 2019
Forensic IT	Pan and Seow, 2016
Audit IT	Pan and Seow, 2016
Data analytics	Pan and Seow, 2016; Kruskopf et al., 2019

Future accountants and auditors will focus more on more specific things because previously manually operated activities are operated by technology through automation (Kruskopf et al., 2019). Future auditors will focus on output analysis instead of spending hours to check financial statements. Accounting profession’s expertise needed in the future include IT knowledge, forensic IT, audit IT and data analytics (Pan & Seow, 2016). Meanwhile, Kruskopf et al. (2019) predict the jobs available for accountants in the future as blockchain accountant, healthcare accountant, cybercrime accountant, fintech account, cloud accounting specialist, fintech city planning accountant, data security accountant, historical accounting analyst, system integrator, and strategic accounting analyst. These jobs do not only require knowledge but also skills, both hard and soft. Hard skills include the ability to understand software, analytical skill, data visualization, international standard knowledge on accounting, knowledge on specific industrial regulation, basic coding, fintech knowledge of software, data warehouse management and enterprise resource planning

(Kruskopf et al., 2019). Meanwhile, the soft skills include communication, conflict management, leadership, risk management, decision making strategies, emotional quotient (EQ), adaptability, creativity and customer-orientation (Kruskopf et al., 2019). Therefore, curriculum that teaches these skills is needed for prospective accountants to compete in the future.

Industrial revolution 4.0 taking place today is actually an opportunity to improve accountants' skills and new expertise, especially young accountants, for them to compete and perform well in their profession as accountants. There are five steps that young accountants can follow to compete in industrial revolution 4.0. Table 7 explains the five steps for competition in industrial revolution 4.0.

Table 7. Steps for Young Accountants to Compete in Industrial Revolution 4.0

Number	Step	Employee's contribution to rapid automation environment
First Step	Step up	Employees can improve skills that computer cannot do. Computer can do bookkeeping and accounting activities more accurately and punctually, but cannot perform planning activities and arrange corporate strategies.
Second Step	Step aside	Not all employees are capable of planning and arranging corporate strategies, but can do things that computer cannot do and focus on commitment while putting aside tasks that computer handles.
Third Step	Step in	Not every automatic system operates smoothly. Problems sometimes occur in company's automatic accounting system and it occasionally does not run optimally, requiring accountants to interfere and fix the situation. Accountants can take over all activities done by computer for company's non-interrupted information generation.
Fourth Step	Step narrowly	Employees can step narrowly on the ongoing automation to find any loopholes and opportunities to develop in accounting.
Fifth Step	Step forward	With continued technology development, employees are encouraged to develop computing and automation devices further. Accountants have the opportunity to develop new accounting devices in the future.

Source: (Goh et al., 2017)

CONCLUSION

Industrial revolution 4.0 brings to the business world significant changes. Activities currently performed using software and requiring human based data entry will gradually change and be replaced with well-structured artificial intelligence technology. In addition to activities which may change job opportunities, there are jobs which may be quite likely be replaced by technology and automation. Industrial revolution 4.0 does not only eliminate some technical jobs, but also creates new job opportunities for the people.

Although industrial revolution 4.0 offers various work facilities, effectiveness and efficiency, humans still have advantages in terms of emotional intelligence, improvisation and decision making abilities irreplaceable with technology. Technology serves to help humans with work, not to replace humans' role. Accounting profession does not only face threats in industrial revolution era 4.0 from technological development, but also regarding accountant's professionalism. Accountants must maintain good practice to keep public trust in their independence, know how accountants compete in the future and have the expertise required in industrial revolution 4.0. Education and higher education are needed to create a competence-based curriculum and produce young accountants who are adaptive to future condition. Therefore, we may conclude that sophisticated technology still requires the involvement of humans. Opportunities will be present anyone with special expertise and ability to compete in accounting.

This study can be used in curriculum for schools and higher education institutions on the growth of industrial revolution 4.0. The results can be taken to enhance teaching method and learning innovation for young generation in the digital technology era.

This study is limited to accounting profession's threats and opportunities in industrial revolution 4.0 in general. Accountants should explore special expertises and competences more to face industrial

revolution 4.0. Accountants' technical jobs cannot be replaced by automation, and there are some competences of accountant that the industry needs.

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