

The Readiness of Accounting Students in Facing the Effect of Industrial Revolution 4.0

Sri Astuti¹, Sucahyo Heriningsih² and Marita³

^{1,2,3} UPN "Veteran" Yogyakarta, Indonesia



Abstract – This research is a descriptive qualitative research. The purpose of this study is to explore the knowledge of accounting students on the Industrial Revolution 4.0 and their impact on accounting. In this digital age the role of accountants has changed to become a provider of insight data, advisors, partnering with technology, and developing into new areas. For this reason students are required to master Industrial Technology 4.0.

Respondents in this study are accounting students at UPN "Veteran" Yogyakarta who have taken financial accounting courses. Data collection techniques are carried out through questionnaires. The questionnaire contains the level of student knowledge of the Industrial Revolution 4.0; the impact of the industrial revolution on accounting and the ability of students to integrate the Industrial Revolution Technology 4.0.

The number of students who became research respondents was 237. Based on the frequency distribution, it can be concluded that 9.3% from 237 students really understand Industrial Revolution 4.0; 19% from 237 students really understand the effect of Industrial Revolution 4.0 on Accounting; and only 14.3% from 237 students who really understand the integration of industrial revolution 4.0 on accounting and business.

Keyword – Industrial Revolution; Accounting; Digital.

I. INTRODUCTION

Industrial revolution is a rapid change in economics, from agrarian economic to industrial economic activities by using machines in processing raw material into ready-to-use materials. Industrial revolution has changed the way humans work from using hands into using machines (Ali, 2019). Industrial revolution 4.0 refers to the development of information technology that is disruptive towards the way organization and professional conduct business. This industrial revolution 4.0 was started in 2015s when digital era was started that supported smart factory, by using autonomy decision making system, machine learning, Internet of Thing (IoT), cloud technology and big data analysis.

Increasingly rapid digital development is the signal of automation era. It means that the role of technology started to move the control of work that was usually done by

human. There are some potential benefits of Industry 4.0 which are the improvement of speed-flexibility production, the improvement of services to customers, and the improvement of income. Realization of the potential benefits will give positive effect on the economics of a country. Industry 4.0 really offers many benefits, but it also has challenge that must be faced. Drath and Horch (2014) argued that the challenge that must be faced by a country when applying Industry 4.0 is the emergence of resistance toward demographic change and social aspect, as well as instability.

Big Data are series of data that have great and complex size so that they are difficult to be analyzed by using standard method and analysis tool. The characteristics of big data are 3Vs: volume, velocity, and variety (McAfee and Brynjolfsson, 2012). Volume is the size of the data, Velocity refers to the speed of data to be processed, and Variety is the variation of data type.

Big Data Analytics is a process of inspecting, cleaning, transforming, and modeling big data to discover and communicate information and patterns, to give advice and to support decision making. Big data have been used for data advanced analytics in other business areas, but still felt difficult to be used for some auditors.

It cannot be denied that big data are able to give significant benefits for business. The benefits of Big Data for business among others are (1) can be considered as an investment, where the real implication can be felt during the process of research and the interpretation of Big Data. Company uses the result of Big Data analysis to obtain business value. This analysis result is then applied to produce solutive and implementative business strategy. Moreover, it is for optimizing operational and recognizing inefficiency to applying predictive analytics to anticipate events such as escaping customers, product failure, or the decrease of quality, and financial fraud; (2) companies can expand after looking at customer's potency and user's behaviour; (3) gold mine to data experts because many data providers who sell their data analysis with high price; (4) Human Resources of companies use Big Data to know the employees comprehensively, to predict employees' behaviour, to reduce expenses, as well as to create business strategies that have positive implications. The example is by using LinkedIn to track and to analyze the ability, knowledge, experience, and career record of employees, former employees, and prospective employees; (5) in all, Big Data make business decision making that is based on scientific and measurable data, not based on common sense, intuition, or practical policy.

Industrial Revolution 4.0 has changed all business processes, and it affects on the role of accountant. The important competencies to accountant profession in integrating Industrial Technology 4.0 among others are data analysis, information technology development, and leadership skills. The technology must be owned and developed by accountant. As the effort to respond Industry 4.0, accountant must be equipped in: investment in the development of digital skills; responsive toward industry, business, and technology development; education based on internation certification and digital skills; apply new technology prototype, learn by doing. The role of accountant has been totally changed. In this digital era, accountant role has been changed into insight data provider, consultant, partner with technology, and developing to new areas. Therefore, students are required to master Industry Technology 4.0.

Industrial Revolution 4.0 that is the continuation of Industry 3.0, is digitization process in manufacturing sector with various sensors planted in all components of production process. In other words, Industry 4.0 is the combination from the latest technology in supporting smart production process done by humans. The era of Industry 4.0 focuses on the digitization of all physical assets and integration into digital system that is interconnected with supply chains.

The transformation that occurs and directly affects the performance of accountant as the effect of Industrial Revolution 4.0 is the existence of big data analysis (Martani, 2018). The effect is that big data analysis (1) provides new sources of non-financial data, (2) it helps special decision and provides evaluation on the decision, and (3) big data analysis becomes hard evidence. Therefore, conventional accounting has developed its concept to digitization accounting. It is needed strong understanding by accounting students so that they are able to compete in work place.

II. LITERATURE REVIEW

2.1. Industrial Revolution 4.0 and Its Effect on Accounting

Industrial Revolution 4.0 as the continuation of Industry 3.0, is the digitization process in manufacturing sector with various sensors planted in all production process components (McKinsey & Co., 2015). In other words, Industry 4.0 is the combination of various latest technologies in supporting smart production process done by humans. The era of Industry 4.0 focuses on digitization all physical assets and integration into digital system that are interconnected with supply chains.

There are at least 4 (four) characteristics of Industry 4.0 era (Deloitte, 2015) which are:

- a. Vertical network of smart production system. This vertical network uses Cyber-Physical Productions Systems – CPPS) for enabling production to respond fast toward the change of demand or stock level and error.
- b. Horizontal Integration through new generation of global value chain network. This new value creation network is network that is optimized in real time that enables integrated transparency, offers high level of flexibility to respond faster toward problem and error, and facilitates better global optimizing.
- c. Through manipulation in all value chains. Development and creation of new product and production system are integrated and coordinated with

the product life cycle, enable new synergy that will be made between product development and production system.

- d. Acceleration through exponential technology. Industry 4.0 has been using automation to be very cognitive and autonomous. Artificial Intelligence (AI), advanced robotics, and sensor technology have potency to increase further autonomy and to accelerate individuality and flexibility.

According to Hermann et al (2016), Industrial Revolution 4.0 has 6 basic principles, which are (1) Interoperability or interconnection, which is the ability of machine, device, sensor, and human to connect and communicate one to another through Internet of Things (IoT) or Internet of People (IoP). This principle needs collaboration, security, and standard. (2) Virtualization is the ability of information system to create virtual copy of physical world by enhancing digital model with sensor data including data analysis and information providing. (3) Decentralization that uses ability of virtual physical system to make personal decision and to conduct job as effectively as possible. (4) Real-Time Capability, where smart system must be able to collect data in real time, to save or analyze them, and to make decision in accordance with new finding. (5) Service-Oriented, where production must be oriented to customers. People and object/smart device must be connected efficiently through internet service to make product based on customer specification. (6) Modularity, where in dynamic market, the ability of system to adapt with new market is very important. Smart system must be able to adapt fast and smoothly toward seasonal change and market trend.

Accountant is a profession directly related in it so that it affects disruptive on how an accountant carries out the profession he/she carries, besides having to adapt by increasing self capability to face industrial revolution 4.0 that has been initiated.

Accounting must be responsive toward people's needs and must reflect the conditions of social, political, law, culture, and economics where the accounting operates and being applied (Suwardjono, 2016). The statement is in accordance with the curriculum guide published by Menristek Dikti (the Ministry of Research and Technology of Higher Education) in 2019. In the guidebook, it is explained that Universities in Indonesia must be able to produce humans who are ready to adapt with technology updates, people's needs, as well as the needs of graduate

users. Universities are free in developing curriculum used with referring to SN-DIKTI.

The study done by Livdan and Nezlobin (2017) stated that curriculum used in conventional accounting focuses on memorizing ability that causes students unable to develop the real competence needed in accounting. In other study, it is mentioned by Lashine & Mohamed (2013) that the main characteristic of education 4.0 is that by conducting dialogue between student and lecturer or fellow student in class as well as the support of information technology is able to give effectiveness in accounting learning. This practice is known as practice of heutagogy which gives space to students to design their self-direct/determined learning. The difference in this study states that there is a paradigm difference in the world of accounting education. Universities are required to produce students in accordance with learning outcomes needed in working world by opening themselves to surrounding changes and renewing as well as developing learning model in class. Duff (2014) stated that accounting learning must change by following the environmental change and responding technology development to keep developing and usefull.

Suwardjono (2016) stated that accounting in technology perspective is based on planned and systematic process involving thinking, reasoning, and consideration to choose and determine theory, available knowledge, concept, method, technique, and approach that produce a product (concrete or conceptual). This planned and systematic process makes accounting contribution bigger for knowledge and life.

2.2. Big Data Analysis and Accounting

Big Data are series of data that have great and complex size so that it will be difficult to analyze them if using standard method or analysis tool. The characteristics of big data are 3Vs: volume, velocity, and variety (McAfee and Brynjolfsson, 2012). Volume is the size of the data, Velocity refers to the speed of data to be processed, and Variety is the data type variation.

Big Data Analytics is a process of inspecting, cleaning, transforming, and modeling big data to discover and communicate information and patterns, to give advice and to support decision making. Big data have been used for data advanced analytics in other business areas, but it is still felt difficult to be used by some auditors.

The problems of financial accounting and financial reporting in big data era have been serious problems. Many researchers studied how big data technology and big data

analysis help to solve the problems between user and compiler of financial report because the data set is easier to be accessed and the new data type appears in real time (Coyne et al., 2018). Sun et al. (2018) stated that big data analysis can be used to support decision making, create prediction model of future opportunities, and analyze as well as optimize business process. Warren et al. (2015) emphasized that big data can significantly affect the future of financial reporting and accounting principle evolution that can be accepted in general. Coyne et al. (2018) analyzed the role of accountant in big data. According to them, accountant must play important role in Big Data information governance because they have sharp ability to identify information and control the needs of internal and external decision makers. In the other side, Palem (2014) argued that many companies become aware that they need big data, but they do not really understand of what they need for.

III. RESEARCH METHOD

This study is a descriptive qualitative research. This method is suitable in this study because this study tries to search a description of a group of humans for achieving the objective of the group, so the phenomena of the group can be revealed clearly and accurately. **The objective of this study is to discover the knowledge of accounting students toward Industrial Revolution 4.0 and its effect on accounting.**

Moleong (2014) argued that qualitative study is a research procedure that results descriptive data in written or oral words from people and behaviours that are observed. Descriptive method is chosen because the study done is related to occurring events and related to the present condition. The aim of this descriptive study is to make description, illustration or picture systematically as well as the relation among investigated phenomena.

Respondent in this study is accounting students of UPN "Veteran" Yogyakarta who have taken the subject of financial accounting. Data collecting technique is done through questionnaire distribution that can be downloaded from google document.

Research Instrument. In a qualitative study, the researcher is the key instrument in collecting data and interpreting data based on the list of questions (Moleong, 2014). Because in the answers of questions given in the questionnaire describe that the researcher is as the reality constructor based on the observation and the experience in the field.

The list of questions that will be explored by the researcher to obtain the description of students' understanding on the effect of Industrial Revolution 4.0 on accounting viewed from the perspective of big data understanding according to Ali (2019) is as the following:

1. Student's knowledge level toward Industrial Revolution 4.0.
2. Student's knowledge on the effect of Industrial Revolution 4.0 on Accounting.
3. Student's ability to integrate Technology of Industrial Revolution 4.0 with the course.

IV. RESULT AND DISCUSSION

4.1. Data Description

This study is a survey research by using primary data. Data are obtained by using questionnaire instrument with respondent of students of accounting program of UPN "Veteran" Yogyakarta who have been in the third semester and above. The respondent data of this study are shown in Table 1.

Table 1. The respondent data

No	Information	Total
1	Active students in even semester of academic year TA 2019-2020 (Class 2016, 2017, 2018)	565
2	Distributed questionnaires	400
3	Students who did not fill the questionnaire completely	163
4	Returned questionnaires and can be processed	237

The level of returned questionnaires is 59.25%. This level of returning is more than 20% from the minimum

criteria, so the data in this study will be used to be further analyzed.

The variables investigated in this study include:

1. Students' knowledge level on Industrial Revolution 4.0. This variable will be measured by using 14 lists of questions.
2. Students' knowledge on the effect of Industrial Revolution 4.0 on Accounting. This variable will be measured by using 6 lists of questions.
3. Students' ability in integrating the technology of Industrial Revolution 4.0 with the course. This variable will be measured by using 13 lists of questions.

Each question will be answered by using Likert Scale. Likert Scale used in the questionnaire consists of 4 scales. Scale 1 is when the answer from respondent shows not understand. Scale 2 is when the answer from respondent shows less understand. Scale 3 is when the answer from respondent shows understand. Scale 4 is when the answer from respondent shows highly understand.

The aim of this study is to discover the knowledge of accounting students of UPN "Veteran" Yogyakarta in order

to face the effect of Industrial Revolution 4.0 in Accounting. Therefore, the answers of each question will be analyzed by using descriptive analysis and frequency distribution analysis.

Frequency Analysis

1. **Students' knowledge level on Industrial Revolution 4.0.** This variable will be measured by using 14 lists of questions. The answers of respondents mostly are in scale 3 (85.7%), and the answers with scale 4 are as many as 9.3%. Based on the frequency distribution, it can be concluded that 9.3% or 22 persons from 237 students really understand Industrial Revolution 4.0. Most students, which are 85.7% have not really understood Industrial Revolution 4.0. Meanwhile, 5.1% or 12 students do not understand Industrial Revolution 4.0.

Table 2. Variable Students' knowledge level on Industrial Revolution 4.0.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2.00	12	5.1	5.1	5.1
3.00	203	85.7	85.7	90.7
4.00	22	9.3	9.3	100.0
Total	237	100.0	100.0	

2. **Student's knowledge on the effect of Industrial Revolution 4.0 on Accounting.** This variable will be measured by using 6 lists of questions. The answers from respondents mostly are in scale 3 (75.1%), and the answers with scale 4 are as many as 19%. Based on the frequency distribution, it can be concluded that only 19% or 45 persons from 237 students really understand

the effect of Industrial Revolution 4.0 on Accounting. Most of students, which are 75.1% have not really understood the effect of Industrial Revolution 4.0. Meanwhile, 5.9% from 237 respondents or 14 students do not really understand the effect of Industrial Revolution 4.0 on Accounting.

Table 3. Variable Student's knowledge on the effect of Industrial Revolution 4.0 on Accounting

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2.00	14	5.9	5.9	5.9
3.00	178	75.1	75.1	81.0
4.00	45	19.0	19.0	100.0
Total	237	100.0	100.0	

3. **Students' Ability in integrating the technology of Industrial Revolution 4.0 with the course.** This

variable will be measured by using 13 lists of questions. The answers from respondents mostly are in scale 3

(82,7%), and the answers with scale 4 are as many as 14.3%. Based on the frequency distribution, it can be concluded that only 14.3% or 34 persons from 237 students who really understand the integration of industrial revolution 4.0 on accounting and business. Most students, which are 82.7% have not really understood the integration of industrial revolution 4.0

on accounting and business. As many as 0.4% of 237 respondents or 1 student does not really understand the integration of Industrial Revolution 4.0 technology with the course. Meanwhile, 2.5% or as many as 6 students do not understand the integration of Industrial Revolution 4.0 technology with the course.

Table 4. Variable Students' Ability in integrating the technology of Industrial Revolution 4.0 with the course

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.00	1	.4	.4	.4
2.00	6	2.5	2.5	3.0
3.00	196	82.7	82.7	85.7
4.00	34	14.3	14.3	100.0
Total	237	100.0	100.0	

A similar study was conducted by Ali (2019), but the research respondents were accounting lecturers. The result is accounting lecturers in Indonesia have realized the importance of the Industrial Revolution 4.0 for accounting and its influence on education in Indonesia. However, the majority (73%) have not integrated the materials of the Industrial Revolution 4.0 into the curriculum (courses) of S1 accounting study programs. This shows the gap between knowledge and action in the teaching process. While this study uses accounting student respondents. Accounting students' understanding of knowledge about the industrial revolution, especially the industrial revolution 4.0 will greatly impact the smooth learning process. This will be a consideration for academics, especially the accounting study program in preparing curriculum in accordance with the needs of technological and business developments and the labor market.

Students are the main players in facing the challenges of the Industrial Revolution 4.0. Guidance from lecturers, support from the government and surrounding communities and with adequate facilities students will be able to deal with industry 4.0. In addition to academic degrees, there are four things students must have to fight in the era of the industrial revolution 4.0 namely competence to interact with various cultures, social skills, new literacy (data, human technology) and lifelong learning (Natsir, 2019).

V. CONCLUSION

The industrial revolution 4.0 is rolling and is moving towards even more complex developments. Rapid developments in integrated sensor, interconnection and data analysis technology have been applied in various industries

in this era. The impact that we feel as a result of industry 4.0 development is the rise of the Start Up business. The industrial revolution 4.0 moves to change things that are conventional to Cybernet or Technodata.

Quality human resources deserve attention in efforts to create Indonesia as a developed nation, because creativity and innovation are critical success factors in surviving this competitive era. Aside from being a technology user, students must also play a role in producing creativity and innovation in order to welcome the development of the current industry 4.0. Students can play an active role by frequently enriching literacy and conducting research on things that are not yet known so that creation and innovation can be created.

The development of student abilities in adopting this technology 4.0 can be started in tertiary institutions. The tertiary institution must prepare a relevant curriculum, so that graduates can be prepared in the available jobs.

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