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Cloud Accounting : The Development of Accounting Information System in Industry 4.0 in Indonesia

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Abstract

The digitalization era of Industry 4.0 in Indonesia has significance roles in business sectors and accountancy in which they are progressing and developing. Future accountants are expected to equip upgraded-skills due to the globalization and digitalization of Industry 4.0. The trend of emergence technologies in accounting information system is Cloud Accounting. Hence, the digital transformation of the accounting information system is important for accountants to be fully aware that traditional accounting system will be gradually replaced to more digitalized accounting system. This paper focuses on the needs of Cloud Accounting and the extent of the development of accounting information system in Industry 4.0 in Indonesia. The research methodology of the study is qualitative analysis. Interview, questionnaire and focus group discussion were conducted to gather information from views of accounting business providers, practitioners, and accountants. Published journals of related topic were also examined to get viewpoints of the researchers. The results show that 90% of the respondents agree that accounting information system has evolved to more digitalized accounting system in Industry 4.0. Future accountants will have more challenging accountancy roles due to the digitalization on accounting information system in which digitalized accounting information system will take over with the advancement of technology through education and higher education should prepare future accountants by knowledge of Cloud Accounting in the curriculum of accounting study program.

Keywords: Future Accountants; Accounting Information System; Cloud Accounting; Industry 4.0; Digital Transformation.

I. INTRODUCTION

As time keeps ticking fast along with the fast advance in technology, it is inevitable that people must catch up with the evolution of technology whether it is for daily activities, companies, factories, or other industries. Technology can help to enhance performance and improve activities to be faster, more precise, and accurate, and hence increasing the productivity of business. Indonesian Industry Minister Airlangga Hartarto [1] stated that Indonesia has been entering the new era of Industry 4.0 which marked by the increasing connectivity, interaction, as well as more

convergent people, machines, and other resources as the result of information and communication technology advancement. The readiness of Indonesia to face the challenges of Industry 4.0 is supported by the roadmap of Industry 4.0: Making Indonesia 4.0 which was officially launched by the Indonesian President Joko Widodo in 2018. Indonesian President Mr. Joko Widodo stated that Industry 4.0 has given Indonesia an opportunity to achieve the highest rank of global economies by 2030 [2].

In the fourth generation of industrial revolution, it becomes a major leap forward for the industrial sector, where information and communication technology are fully utilized. Not only in the production process, but also across the industry value chain hence creating new business models on a digital basis to achieve higher efficiency and better product quality. Most business process nowadays still use old methods without the utilization of technology. Of course, this will hamper the company's performance as data processes are relatively slow, prone to errors and the occurrence of misuse or fraud. One of processes which can be helped to develop the accuracy of information and improve decision-making organizational activities by information systems is accounting. Accounting information system is defined as collecting, recording, storing, and processing accounting to produce information for decision makers. An information system in accounting is the combination of the people and technologies, in an organization that collect, record, store and process data to produce the information needed to make informed decisions as shown in Figure 1 [3].

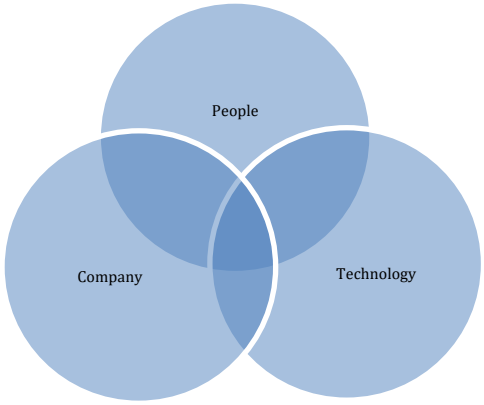

Figure 1. The Components of an Information System

Industry 4.0 not only impacts industries and manufacturing businesses but also accounting system. It has indirectly transformed the accounting role into a more advance-digitalized system. As a result, accounting will evolve gradually from traditional to technology-based system [4] [5].

The evolution of accounting changes the expectations of clients and accountants are forced to adjust the way they do to fulfil demands. People are ready to do less paperwork as they need to focus on what they are passionate on the things they want to do. This also means that people will need to depend on technology that will help their work in a more integrated method. One of current technological trends is the fast development of cloud technology [6].

Cloud is web-based storage data which can be accessible anywhere anytime with internet connection. Cloud accounting is way to access and process data online using web browser. Data is stored in the cloud – on a remote server that is not on the company's site. Traditional accounting runs on desktop computer with software installation while cloud accounting is a service provider which requires no installation and maintenance software on desktop computer. Cloud accounting requires less maintenance, completes backup, updates financial information automatically and provides financial reporting in real-time. Working on the cloud will give the opportunity to save the time that we spend working on tedious, time-consuming tasks and allow us to focus on growing businesses [7]. Hence, cloud accounting is the transformation of the utilization of accounting information system for all businesses.

II.LITERATURE REVIEW

1. Industry 4.0

The Industrial Revolution 4.0 has impacted changes towards work in humans, machines, technology, and processes in various professional fields, including the accounting profession. These changes also have a significant impact on the development of accounting. [8] emphasized that people will be more connected to mobile devices with unlimited access to knowledge, processing power and storage capacity. [9] As the technology is advancing in Industry 4.0, it will gradually impact on accounting practices. In other words, accounting practices will evolve through the deployment of industry 4.0 and accountants will be facing a bigger challenge in the digitalized accounting system.

Industry 4.0 has the role of digital transformation to business and social networks. All networks and interfaces will be in the range of IoT, services, data, and people in the future. There are four characteristics of Industry 4.0 which have changed the capacity in industry and manufacturing: vertical networking, horizontal integration, through-engineering across the entire value chain and exponential technologies [10].

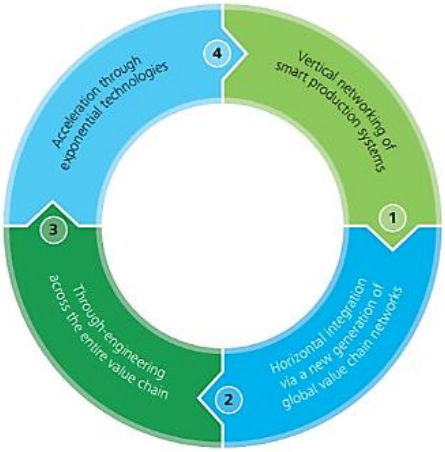

Figure 2. The four characteristics of Industry 4.0

According to [11], accurate and reliable analysis are the two occurrences in the revolution of Industry 4.0. As machines will eventually replace humans in factories and businesses, it will also impact on the role of accountants who will face challenge of efficiency in human resources and focus on the long-term strategies.

2. Accounting Information System

[12] Information is data that has been managed and processed to give meaning and improve the decision-making process. As it plays its role, users make better decisions as to the quantity and quality of information improvement. Information is also data sets which have important values that can be as a support to be used as guidelines for decision-making in businesses. [13] Accounting information system is a system that collects and processes data transactions and submits financial information to internal and external parties. [14] It is stated that accounting information system is a computer-based method to trace accounting activity with the application of IT resources. According to [15], the information system is the set of formal procedures by which data are collected, processed into information, and distributed to users. It consists of three major subsystems: (1).Transaction Processing System; (2)General Ledger System and Financial Reporting System; (3)Management Reporting System. [16] Accounting information system is focused on five cycles such as revenue, expenditures, human resources, production and finance.

3. Cloud Accounting

[17] Cloud accounting is considered in business model as a service. Cloud accounting is the transformation of accounting applications and modernized-business environment solution. According to [18], cloud system or cloud computing is on the demand delivery of computing services that do not need the active management by the users of the service. It offers services consisting of hardware and software using the internet. In cloud system, services like data and software can be accessed from anywhere and anytime using the internet via the service provider of the cloud application.

Cloud accounting is the combination of cloud computing and accounting by utilizing web server to construct virtual-accounting-information-system [20]. Cloud accounting services consists of three models [20], namely Infrastructure as a Service (IAAS), Platform as a Service (PAAS) and Software as a Service (SAAS). Cloud technology has four types of cloud deployment models [21]. The deployment models are differentiated based on type of implementation, type of hosting and authorized access such as Public Cloud, Private Cloud, Hybrid Cloud and Community Cloud.

III. RESEARCH METHODS

This research uses qualitative analysis through in-depth interviews and focus group discussion to academic, accounting association, practitioner, client, and accounting service provider. There are five methods used in this research framework namely: ethnography, narrative, phenomenological, grounded theory, and case study [22]. The unit analyses of this research are accounting service providers and cloud-based system located in Tangerang and Jakarta. The research of study analyses the needs of cloud accounting adoption in Indonesia and the development of AIS in Industry 4.0 by inviting experienced practitioners from established companies to share their experiences and opinions through in-depth interviews and Focus Group Discussion [23] to academic, accounting association, practitioner, client, and accounting service provider. Questionnaires were also distributed randomly to accountants, practitioners, academics, clients, and service provider including for non-cloud accounting practitioners as part of exploratory research.

Table 1. The Five Qualitative Methods

Method	Focus	Data Collection
Ethnography	Context or Culture	Interviews
Narrative	Individual experience & sequence	Stories from accountants, academic, practitioners and service provider
Phenomenological	People who experienced a phenomenon	Interviews
Grounded Theory	Develop a theory from grounded in field data	Questionnaire and interviews
Case Study	Organization, entity, individual or event	Articles and interviews

Source: Creswell [22]

There are several stages that must be conducted at the qualitative research explained by [22] as follows:

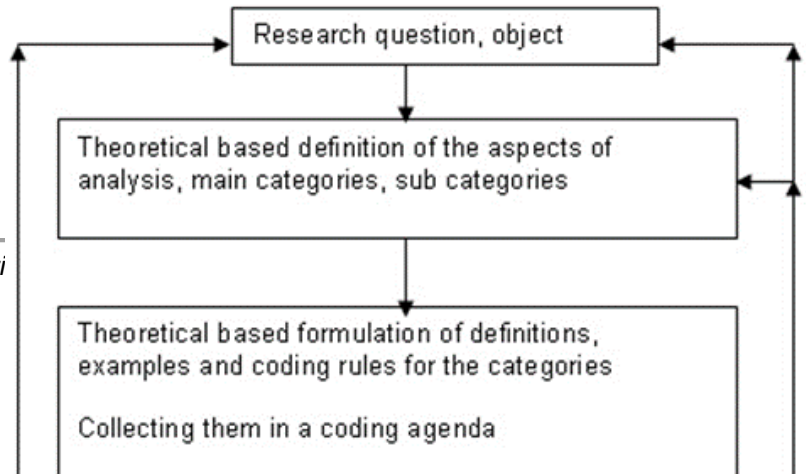

Figure 3. The Research Design for Qualitative Research

The figure explained some stages must be taken from preparing and designing the questions and supported by strong fundamental theories. Then, the result of data collection must be explored through summarizing approach. The final stage is interpretation of the result to achieve objective finding of qualitative research.

IV. FINDINGS AND RESULTS

The research comes up with two parts of findings through Questionnaire and Focus Group Discussion [23]. First finding is from questionnaires distributed to 100 respondents randomly to accountants, practitioners, academics, clients, accounting associations and service provider. Questionnaire survey was divided into 4 scales from “Strongly Disagree (SD)”, “Disagree (D)”, “Agree(A)”, “Totally Agree (TA)” and it was distributed to 100 randomly accountants, practitioners, academics, clients and service provider including for non-cloud accounting practitioners. From 100 surveys, 90 respondents (90% response rate) have supported and given their answers to the needs of Cloud Accounting in Indonesia and the transformation of AIS in Industry 4.0.

Table 2. Qualitative Findings on Cloud Accounting

No	Questionnaires	Survey Findings
1	Cloud Accounting is the web-based application of accounting software which can be accessible anywhere anytime with internet connection.	64% of respondents totally agree and 27% of respondents agree
2	Cloud Accounting will gradually replace traditional accounting in Industry 4.0. Traditional accounting is what accountants do on desktop computer with software installation while Cloud Accounting is a service provider which requires no installation and maintenance software on desktop computer.	51% of the respondents totally agree and 31% of respondents agree
3	Indonesia is accelerating digital transformation as Industry 4.0 has big impacts to all business sectors. Some impacts of business transformation are Big Data and Data Analytics which indirectly requires the changes in the role of accountancy.	47% of respondents totally agree and 40% of respondents agree
4	Cloud Accounting comes with automation capabilities that allow bookkeepers or accountants, to maximize efficiency and save more time, enable them to devote more time and resources to the growth of the business	54% of respondents totally agree and 35% of respondent agree
5	Cloud Accounting supports green environment program and has the ability to integrate with other cloud solutions which will enhance the power and improve the efficiency of cloud accounting technology stack	54% of respondents totally agree and 33% of respondents agree
6	Cloud Accounting has challenge concerns of security threats such as account hijacking, hacked API and interfaces, broken authentication, compromised credentials and data breaches	50% of respondents totally agree and 34% of respondents agree
7	More expertise in cloud accountants are sought for and faced by businesses today. As the increasing workload being stored in the cloud, it becomes essential for businesses to provide additional training for accountant staffs	50% of respondents totally agree and 35% of respondents agree
8	Cloud Accounting is part of big investment for a business. Another challenge in Cloud Accounting is cost management as sometimes it is hard to define and predict costs and quantities	34% of respondents totally agree and 35% of respondents agree

	because of the scalable and on-demand nature of cloud computing services	
9	Accountants will find Cloud Accounting can help to manage their bookkeeping easily, automatically update financial data and provide real-time financial reporting	58% of respondents totally agree and 28% of respondents agree
10	Accountants must prepare and familiarize themselves to be equipped with cloud platform services to assist the business process to achieve their goals	53% of respondents totally agree and 36% of respondents agree

Second finding is from Focus Group Discussion interviews to accounting service providers and practitioners from reputable companies which has adopted computerized accounting system and cloud accounting. The questions in relation with objectives of research are: what is industry 4.0 in accounting; the impact of industry 4.0 towards accounting and role of accountancy; will Cloud Accounting replace the traditional accounting in the future in Indonesia; is Cloud Accounting important in education; how fast Indonesia is catching up with cloud technology. These findings were summarized and interpreted into six points of exploration: (1) The evolution of AIS in Industry 4.0; (2) The impact of Industry 4.0 towards accounting and role of accountancy; (3)The importance of Cloud Accounting for accountants; (4) Accurate as the Example of Cloud Accounting Service Provider; (5) Pros and Cons of Cloud Accounting; (6)The Importance of Cloud Accounting in the Accounting Curriculum.

Table 3. Qualitative Findings on FGD

Item	Exploration	Findings
1	The evolution of AIS	Accounting information system has evolved into digitalized system impacted from Industry 4. 0 which accountants will not do the double entry manually align with the advancement of technology. Traditional accounting will gradually be replaced with automated accounting system supported by the technology in the digitalization era such as tools for invoicing will be done by computers.

2	The impact of Industry 4.0 towards accounting and role of accountancy	The technology impacted by the fourth industrial revolution in the perspective of accounting will be such as: Data Analytics, AI, IoT, Blockchain, Cloud Computing. In role of accounting, the most impacted in accounting from Industry 4.0 will be Data Analytics or Big Data. Data analytics is related to relational databases in accounting information system whereas historical data and accounting transactions are managed and analysed including auditing. Another important impact of Industry 4.0 in the role of accountancy is Cloud computing. Cloud Computing is accounting information system using cloud-based technology as the cloud centre, where users can access, manage, and audit the data if it is connected to internet.
3	The importance of Cloud Accounting for accountants	The transition from desktop accounting to cloud accounting is happening and it is crucial for accountants to prepare this challenge. Accountants who have not been adjusted to the technology stack will face more difficulties in their roles comparing to accountants who have aware of the transitioning due to globalization and digitalization era. Accountants need to be equipped with hard skills analytics such as SQL Query, Tableau, Power BI to be able to analyse data in large number.
4	Accurate as the Example of Cloud Accounting Service Provider	Accurate as accounting service provider stated that as Indonesia is also catching up with the advancement of technology, cloud-based accounting information system will

		be increasingly demanded and accessed by most users in businesses whether they are from small business or large companies. Accurate accounting service provider is optimistic that even though Accurate is still considered as on-going development of technology impacted from Industry 4.0, it is unquestionably that not only technology of cloud-based accounting information system will be accessed and utilized by public users or businesses, but it will develop soon to android platform with just simply 'click by finger'
5	Pros and Cons of Cloud Accounting	Cloud-based accounting information system has given beneficial such as accuracy data, faster data entries and up-to-date data, integrated and centralized system, easy-to-access mobile, human resources efficiency and cost saving. However, it has challenges in security issues such as account hijacking, hacked API and interfaces, broken authentication, compromised credentials and data breaches including the stable internet connection.
6	The Importance of Cloud Accounting in the Accounting Curriculum	Accountants with basic IT knowledge are crucial to utilize accounting online in maximum capacity. It is unarguably that future accountants should have knowledge of IT and analytics to perform better in their roles utilizing cloud-based accounting. Accounting students should be given knowledge of cloud technology concept and the difference between on-premises accounting and online accounting although

		both share the same business aspects. Accounting students should also be provided with hands-on practices in cloud accounting and knowledge in relation to the collaboration between web-based accounting with other technology in Industry 4.0 such as Artificial Intelligence or Data Analytics

V. DISCUSSION

From the qualitative approach, several findings are noted to form the conclusion. From questionnaires, 90% of the respondents agreed that Cloud Accounting is digital transformation revolution of accounting from traditional to more autonomous accounting information system impacted of Industry 4.0 towards businesses and role of accountancy [25]. It is undoubtable that accountants must get to familiarize with cloud accounting for the business goals in current time and for the future. The evolution of digital transformation in accounting information system will speed up the accountant's work in more accurate, efficient, and real-time reporting. Although Cloud Accounting still has issues in security and cost management, it is not limited to the possibility of accountants to upgrade their skills to the cloud-based accounting system [26].

The interviews from Focus Group Discussion [23][24] show that accounting information system have evolved into digitalized system impacted from Industry 4. 0 which accountants will not do the double entry manually align with the advancement of technology. Traditional accounting will gradually be replaced with automated accounting system supported by the technology in the digitalization era such as tools for invoicing will be done by computers. The transition from desktop accounting to cloud accounting is happening and it is crucial for accountants to prepare this challenge. Accountants who have not been adjusted to the technology stack will face more difficulties in their roles comparing to accountants who have aware of the transitioning due to globalization and digitalization era [26]. Accountants need to be equipped with hard skills analytics such as SQL Query, Tableau, Power BI to be able to analyze data in large number. One of the examples of cloud accounting which has been recognized nationally in Indonesia is Accurate. Accurate is web-based accounting information system services which has two products: Accurate Desktop and Accurate Online. Accurate Desktop is manual accounting information system run on desktop installation while Accurate online is accounting information system run on web-based using cloud technology and available as accounting tool application for merchandising, services, and manufacturing sectors.

The results from FGD reveal that accountants with basic IT knowledge are crucial to utilize accounting online in maximum capacity. It is unarguably that future accountants should have knowledge of IT and analytics to perform better in their roles utilizing cloud-based accounting. accounting students should be given knowledge of cloud technology concept and the difference between on-premises accounting and online accounting although both share the same business aspects. Accounting students should also be provided with hands-on practices in cloud accounting and knowledge in relation to the collaboration between web-based accounting with other technology in Industry 4.0 [27].

VI. CONCLUSION

Based on the findings and results, the evolution of accounting information system is progressing, and Industry 4.0 has big impacts on role of accountancy as well. The advancement of technology in Indonesia is also happening in alignment with the road map of Industry 4.0 from 2018. Accountants will face a more advance technology towards the improvement and updated accounting system in Industry 4.0. One of the most emergence technology in accounting information system is Cloud Accounting. Business owners and accountants can utilize this system as accounting tool application to help and support the bookkeeping management provided by accounting service provider.

The importance of Cloud Accounting adoption into accounting curriculum for accounting students is emphasized in the study findings. Accounting students must upgrade their skills to be equipped with accounting digital transformation knowledge and practices. The awareness of evolution of accounting information system impacted from Industry 4.0 shall be embedded in curriculum of accounting study program. Cloud accounting is required to be embedded in the curriculum of accounting study program since it has become a requirement skill for future accountants, therefore the adoption of Cloud Accounting model in the learning development of accounting students are necessary and the knowledge of evolution of accounting information system shall be delivered to accounting students.

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