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The Readiness of Accounting Departments Management and Implementation of the Industrial Revolution Curriculum 4.0

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ABSTRAK

Revolusi Industri 4.0 membawa ancaman bagi lulusan akuntansi karena banyak bidang pekerjaan akuntansi yang tergantikan oleh teknologi informasi. Untuk itu, jurusan akuntansi di perguruan tinggi harus siap dengan kurikulum revolusi industri 4.0. Penelitian ini bertujuan untuk menganalisis kesiapan pengelola program studi akuntansi dan implementasi kurikulum revolusi industri 4.0. Penelitian ini dikategorikan sebagai penelitian kualitatif interpretatif. Pengumpulan data dilakukan dengan wawancara mendalam, Focus Group Discussion (FGD), dan dokumentasi. Informan kunci dalam penelitian ini adalah pengelola program studi akuntansi dan tim ahli dari Ikatan Akuntan Indonesia. Hasil kajian menyebutkan bahwa jurusan akuntansi telah menyiapkan berbagai langkah untuk mengimplementasikan kurikulum revolusi industri 4.0. Kesiapan pengelola departemen akuntansi dan implementasi kurikulum 4.0 dilakukan dalam beberapa tahapan yaitu penyesuaian profil lulusan, redesain kurikulum, perubahan metode pembelajaran, peningkatan kualitas sumber daya manusia, perbaikan infrastruktur laboratorium, dan menjalin kemitraan dengan pemangku kepentingan. Kajian ini juga merekomendasikan mata kuliah yang relevan dan sesuai dengan revolusi industri 4.0. Implikasi dari penelitian ini adalah program studi akuntansi memiliki pedoman penerapan kurikulum revolusi industri 4.0.

ABSTRACT

The Industrial Revolution 4.0 brings a threat to accounting graduates because many fields of accounting work can be replaced by information technology. For this reason, the accounting department in higher education must be ready with the industrial revolution 4.0 curriculum. This study aims to analyze readiness of managers of accounting study programs and the implementation of the industrial revolution 4.0 curriculum. The research is categorized as interpretive qualitative. Data were collected using in-depth interviews, focus group discussions (FGD), and documentation. The key informants in this research are the manager of the accounting study program and a team of experts from the Indonesian Institute of Accountants. The results of the study stated that the accounting department had prepared various steps to implement the industrial revolution 4.0 curriculum. The readiness of the accounting department manager and the implementation of curriculum 4.0 is carried out in several stages, namely adjusting the graduate profile, redesigning the curriculum, changing learning methods, improving the quality of human resources, improving laboratory infrastructure, and establishing partnerships with stakeholders. This study also recommends courses that are relevant and in accordance with the industrial revolution 4.0. The implication of this research is that the accounting study program has guidelines for implementing the industrial revolution 4.0 curriculum.

1. INTRODUCTION

The Industrial Revolution 4.0 brings opportunities and threats for prospective accountants and other jobs in the accounting field. In fact, accountants are one of the jobs that are predicted to disappear as a side effect of the Industrial Revolution 4.0 (Frank et al., 2019; Mohamed, 2018). The tax sector has also been affected by the Industrial Revolution 4.0 due to tax internalization in the digital disruption era (Oztemel & Gursev, 2020; Rainnie & Dean, 2020). Some jobs around accounting will be replaced by technology such as accountant and auditor, bookkeeping, accounting, and auditing clerks, tax examiners and collectors, revenue agents, and budgets analysts (Kroon et al., 2021; Leitner-Hanetseder et al., 2021).

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The challenges for the accounting profession and science to change to adapt to the Industrial Revolution 4.0 are real. As a provider of accounting graduates, the accounting department must catch the signs shown by the Industrial Revolution 4.0. Accounting graduates must be provided with provisions not to be replaced by information technology, big data, and artificial intelligence (AI) brought by the Industrial Revolution 4.0. In addition, the Industrial Revolution will undoubtedly bring changes to education, including the methods and technologies that accompany it (Maria et al., 2018; Morrar et al., 2017). Education 4.0 as the impact of the Industrial Revolution 4.0 requires that the manager of the accounting department must change the mindset from the 3.0 education revolution that produces knowledge to produce innovation and must always change and make students the main source of technological evolution.

Several studies on the impact of the industrial revolution 4.0 on accounting and its scope have been carried out (Rosi & Mahyuni, 2021; Tran & Phan, 2019). Some of the results of these studies state that the accounting system must completely redefine and redesign the implementation strategy in the industrial era 4.0 (Oesterreich & Teuteberg, 2016; Sima et al., 2020; Tran & Phan, 2019). The new accounting will deal with how to process a large amount of data that is mostly unstructured and must be reported in financial statements in order to become important information for decision making (Bhimani & Willcocks, 2014; Rosi & Mahyuni, 2021; Vasarhelyi et al., 2015).

In the academic world of accounting, the readiness of students majoring in accounting to face the world of work in the era of the industrial revolution 4.0 is influenced by ethical competence, knowledge competence, capability competence, relationship competence, analytical competence and locus of control (Saraswati et al., 2020). Entrepreneurs' expectations of accounting graduates in the industry 4.0 era have changed significantly, especially during the preparation, reporting and dissemination of financial information. Accounting practitioners expect accounting graduates to focus on learning in order to acquire knowledge and skills in the IT field (Ghani & Muhammad, 2019; Tuğba et al., 2022). Several studies on the readiness of accounting students have shown that study skills, literacy skills, and life skills affect students' readiness for a career as accountants in the RI 4.0 era (Jiang, 2020; Williams, 2021). Previous research has been conducted on the awareness of students and accounting graduates at the University of Selangor Malaysia on the existence of the Industrial Revolution 4.0 (Razali et al., 2022; Teng et al., 2019). Furthermore, research explores the knowledge of accounting students about the 4.0 industrial revolution and its impact on the accounting department (Hasanudin et al., 2019).

Other previous research stated that accounting students in three ASEAN countries, namely Malaysia, Brunei, and Indonesia experienced confusion, neglect, low levels of preparation, disturbance and uncertainty in facing the industrial revolution 4.0 (Cunningham, 2020; Khairawati, 2020). For this reason, students need several skills that must be prepared, namely complex problem solving, critical thinking, creative thinking, human management, coordinating with other people, emotional intelligence, judging and making decisions, judgment and making decisions, orientation towards service, negotiation abilities, cognitive flexibility (Aliyu & Talib, 2020; Lee et al., 2016). Furthermore, there are eight competencies that must be prepared for a career in the world of work during the 4.0 industrial revolution, namely critical thinking and problem solving, very good verbal and written communication, working together and others in terms, knowledge of digital advancements, future oriented leadership, professional identify & labour ethics, positive job management, and universal & incultural know how (Akos et al., 2021; Spöttl & Windelband, 2021). For this reason, it is very important for the accounting study program to prepare students with the competence to face the industrial revolution 4.0.

The purpose of this research is to explore the readiness of accounting study program managers to the existence of the Industrial Revolution 4.0 and its implementation in accounting learning. The specific purpose of this research is to compile the steps required by the accounting study program to apply the Industrial Revolution 4.0 curriculum and develop course recommendations following the Industrial Revolution 4.0 curriculum. This research implies that the manager of the accounting study program will have guidelines in implementing the Industrial Revolution 4.0 curriculum.

2. METHODS

This research can be categorized as interpretive qualitative (Creswell, 2018; Lemaire & Paquin, 2019). This research was conducted on the accounting department manager because of the need for an analysis of readiness and response to the industrial revolution 4.0. The accounting department is the choice of discussion because of the threat of the loss of several fields of work, such as accountants, auditors, bookkeeping, accounting, auditing clerks, tax examiners, collectors, revenue agents, budgets analysts.

This research focuses on analyzing the readiness and response of the accounting study program to the industrial revolution 4.0 on the curriculum, human resources, infrastructure, laboratories, collaboration with DUDI (Business and Industry), as well as other aspects of the impact of the Industrial Revolution 4.0. The unit of analysis in this study is the informant's opinion about the readiness and response of the manager of the accounting study program to the implementation of the Industrial Revolution 4.0 curriculum. The informants were Mr. Sy, Mrs. RM, Mrs. SB, Mr. AA, Mr. NS, Mrs. AQ, Mr. RM, Mrs. HW, Mr. ZF. Meanwhile, the determination of key informants was done by judgment technique (Prendes-Espinosa et al., 2021; Wall, 2021).

Data collection techniques in this study were carried out by in-depth interviews, focus group discussions (FGD), and documentation (Islam, 2015; Nirwana, 2018). In-depth interviews were conducted with the secretary informants and the head of the study program, namely Mr. Sy, Mrs. RM, Mrs. SB, Mr. AA, Mr. NS, and Mrs. AQ. In-depth interviews were conducted face-to-face and online. Focus Group Discussion (FGD) was conducted online with the participants Mrs. SB, Mr. NS, Mrs. AQ, Mrs. HW, Mr. Sy, Mr. RM, and Mr. ZF. Documentation is done by taking data in several accounting study programs, such as curriculum, practicum documents, activity reports, and industrial revolution web documents.

The validity of the data was tested by using credibility and transferability tests (Biduri & Proyogi, 2021). The credibility test is carried out using two triangulations, namely method triangulation and data source triangulation (Hussein, 2009). The method triangulation test was carried out by cross-checking the results of in-depth interviews with FGD results and documentation data, for example, related to the existence of a new curriculum as a result of the Industrial Revolution 4.0, which was cross-checked between in-depth interviews, FGDs, and study program documentation. Triangulation of data sources is done by cross-checking between one informant and another.

Transferability test is carried out by making parsimony, detailed, clear, systematic, and reliable research report. From the qualitative research perspective, the transfer value of a study depends on the user, to what extent the study results can be applied to other situations. Data analysis was carried out as long as the research took place, as qualitative research is peculiar (Fainshmidt et al., 2020; Turner et al., 2021). The stages of data analysis are data collection, data reduction, data display, and conclusion.

The validity of the data was tested using source triangulation and method triangulation. The informants are certain people who master the research problem. Response data from informants will be cross-checked with the results of the documentation as presented in Table 1 in the following documentation data.

Table 1. Documentation Data

No	Documentation	Source
1	Accounting Department Profile	Profile
2	Accounting Department Organizational Structure	Profile
3	Department Curriculum and Courses	Profile
4	Laboratory and Practical Course	Profile
5	Activities in the Accounting Department	Profile

Source : Documentation Data

The stages after data collection are data reduction stages. At this stage, the writer summarizes and focuses on the important things and looks for the same themes and patterns. Summarizing the data is done by coding as presented in Table 2:

Table 2. Coding Process

Coding	Same Theme or Pattern
1	Readiness and Response to the Industrial Revolution 4.0 in the Accounting Department
2	Implementation of the Industrial Revolution 4.0 Curriculum in the Accounting Department

Source: Data Reduction

3. RESULTS AND DISCUSSIONS

Results

Readiness and Response of Accounting Department Managers to the Industrial Revolution 4.0

Several opinions were generated based on in-depth interviews and FGDs with secretaries and heads of accounting departments at several universities which are presented in Table 3.

Table 3. Interviews and FGD

No	Name dan Position	Interview Excerpt
1	Mr. NS, Head of the Accounting Department at UHW in Surabaya	For the Industrial Revolution 4.0, the implementation in the curriculum has been adopted since 2011, in collaboration with SAP Educate developers, software developers used by the company. So that student are not surprised because of the Industrial Revolution 4.0, students have been provided with it all. The climax is in 2016, which has started to implement courses and added new SIA courses.
2	Mrs. AQ, Head of the Accounting Department of UA Surabaya	To prepare the Unair Accounting Department to face the Industrial Revolution 4.0, we adjusted the existing material, and there must be analysis. There is a new course that we will give to students, it's called Data Science. Furthermore, we also place special emphasis on a number of courses related to the Industrial Revolution 4.0, for example, business feasibility studies, sustainability reports; it feels very connected to the industrial revolution 4.0. For some of the lab courses here, namely application and introduction to auditing practice. For computer applications using Accurate. For HR, we conduct data analysis certification training which will later teach the course
3	Mr. Sy, Head of the UMG Accounting S1 Department	UMG's preparation in facing the Industrial Revolution 4.0 is a collaboration with UMY related to Web-based Audit curriculum and courses. Students are provided with online-based programming applications, such as transactions using Excel. The infrastructure has 30 computers in the Accounting Lab at the Faculty. As for HR, we collaborate with the informatics engineering department for programming applications. Furthermore, some courses must be replaced, or there are new courses. After being evaluated in 2019, we determined that what was once an elective course is now a compulsory subject. Such as database courses and data analysis.
4	Mrs. SB, Secretary of the Department of Accounting S1 UMSIDA Sidoarjo	Our first step is to conduct comparative studies at several Muhammadiyah Universities (PTM). In 2019 we conducted a curriculum workshop based on the industrial revolution 4.0. As a result, there are several new IT-based courses, such as analysis of accounting systems and databases, web and android-based accounting system design applications, and several others. To support this, we collaborate with the department of informatics engineering. For the practicum, almost all courses will be implemented so that the theory goes directly to the software. As for lecturers, we will participate in workshops to support new courses and some certifications for lecturers.
5	Mr. RM, Head of the Department of S1 Accounting UM Jember	We have reconstructed the curriculum that is closer to the profile of graduates who master accounting information systems. Therefore, we have included several information technology courses in our curriculum, such as the Software Design course, theory, and practice. For human resources or lecturers, we collaborate with the Department of Information Technology, UM Jember.
6	Mrs. HW, Secretary of the S1 Accounting UM Yogyakarta	For the ideal implementation of the Industrial Revolution 4.0, it all depends on the graduates' profile of each department. For example, the graduate profile is an accounting programmer, so there are programming-based courses and other IT-based courses in the curriculum. Ideally, all learning and practicum must support the

No	Name dan Position	Interview Excerpt
		graduate profile. The role of stakeholders is very important such as IAI, Departmental Associations, and other universities. Because it is hoped that there will be a guide to basic competencies that students must possess related to RI. 4.0.
7	Mr. ZF, an expert of IAI and lecturer at UA Surabaya	First, the department must redesign the curriculum. The form can be RPS development, adding courses, or replacing courses with those based on the Industrial Revolution 4.0, for example, data analysis, big data, ERP. Second, changing the offline learning method into a hybrid. By utilizing e-learning, zoom, google meet. Third, update knowledge for lecturers by conducting training, certification. Fourth, establish cooperation with partners because many practitioners are more proficient in information technology than lecturers.
8	Mr. ZF, an expert of IAI and lecturer at UA Surabaya	First, the department must redesign the curriculum. The form can be RPS development, adding courses, or replacing courses with those based on the Industrial Revolution 4.0, for example, data analysis, big data, ERP. Second, changing the offline learning method into a hybrid. By utilizing e-learning, zoom, google meet. Third, update knowledge for lecturers by conducting training, certification. Fourth, establish cooperation with partners because many practitioners are more proficient in information technology than lecturers.

Based on the results of the interview with the head of the UMG accounting department, the researcher triangulated the method, namely cross-checking with the applied curriculum. The result is that there are new courses in the curriculum, namely database management, that students must take in semester 4. There are also basic accounting application programming courses, advanced accounting application programming, digital marketing, accounting, and business application projects as elective courses. Based on the interview results with Ms. SB, the researcher triangulated the method by cross-checking with the Umsida accounting department curriculum documents in 2019. The result is that there are several new information technology-based courses. The courses are Accounting System Analysis & Data Base, Web, and Android Application Accounting System Design, Computers Financial Accounting, Public Sector Accounting Computers, and Computer Auditing.

Based on the data collection process through in-depth interviews, FGD, and documentation as well Customizing Graduate Profile, there are several steps taken by the accounting department, there are: (1) Graduate Profile; (2) Curriculum Redesign; (3) Changing Learning Methods; (4) HR Quality Improvement; (5) Improvement of Laboratory Infrastructure; (6) Establishing Partnerships with Stakeholders. Thus six steps need to be considered in implementing the 4.0 industrial revolution in the accounting department. Table 4 presents a summary of the six steps taken by the accounting department manager who became the informant of this research.

Table 4. Summary of Six Steps to Implement Industrial Revolution 4.0 in the Accounting Department

Theme / Informant	Graduates' Profile	Redesign Curriculum	Method of learning	Quality needed	Laboratory	Partnership
Sy	√	√		√	√	√
NS	√	√	√	√	√	√
RM	√	√	√	√	√	√
SB	√	√	√	√	√	√
AQ	√		√		√	√
ZF		√	√	√	√	√
HW	√	√	√		√	√

This study reveals that the industrial revolution 4.0 has made accounting department managers aware of the bottom up in all aspects. This means that accounting education personnel see the development of the impact of the 4.0 industrial revolution on prospective graduates so that department

managers make changes. Because of its bottom-up nature, the improvement by departmental managers cannot be equated between universities. For example, the redesign of the curriculum must adapt to the profile of graduates. This differs from one department to another—likewise, lecturers in the department, facilities, and infrastructure, especially the laboratory. Many accounting lecturers are not familiar with information technology, so they have to "borrow" an informatics engineering lecturer.

Regarding the necessity of the department to redesign the curriculum, this agrees with the previous research which states that the impact of the industrial revolution 4.0 is the design of learning curricula that make students understand the problem of complex technological, social transformation (Broo et al., 2022; Oke & Fernandes, 2020). Likewise, the graduate profile targeted by the department must also make students aware of the information technology faced in the accounting profession.

This research produced several accounting courses based on information technology according to the industrial revolution 4.0 which are presented in Table 5. The course is then juxtaposed with the accounting course of Surianti's 2020 research results. It can be a reference for the accounting department that will implement the industrial revolution 4.0 in its curriculum.

Table 5. Recommendations for Accounting Courses Based on the Industrial Revolution 4.0

No	This Research	Surianti, 2020
1	Database Management	Auditing and Big Data
2	Basic Accounting Application Programming	Management Accounting and Big Data
3	Advanced Accounting Application Programming	Accounting Standards and Big Data
4	Accounting and Business Application Project	Fraud Detection and Artificial Intelligence.
5	Analisis Sistem Akuntansi & Data Base	Financial Crime Detection and Artificial Intelligence
6	Web and Android Application Accounting System Design,	Cost Reduction and Artificial Intelligence.
7	Financial Accounting Computer,	
8	Public Sector Accounting Computers,	
9	Computer Audits.	

Discussion

According to research results, there are six steps that can be taken by the manager of the accounting study program in implementing the industrial revolution curriculum 4.0 (Table 5). In its application, it is adjusted to the conditions in the accounting study program. As a first step is the adjustment of graduate profiles that are tailored to the needs of the industrial revolution 4.0 which requires a lot of ability over information and communication technology (Kowang et al., 2020). Other abilities are soft skills in order to solve complex problems, think critically, think creatively, cooperate with others, be able to negotiate. This ability must be given by the study program in its graduate profile. The second step is to redesign the curriculum. Based on the results of this research, almost all accounting study programs in Indonesia have made curriculum changes with the industrial revolution 4.0 (Adepoju & Aigbavboa, 2021; Hasan, 2021). All include elements of information and communication technology competence in their curriculum. Some new courses or modified courses exist in the accounting study program as in Table 6.

The third step is method of learning. Learning methods must also change by making more use of online learning and artificial intelligence to provide the basis for digital pedagogy (Pozón-López et al., 2021). Leaders or principals are able to change the mentality of educators and education so that they always think positively towards every technological development in the era of Industrial Revolution 4.0. The accounting department should also provide more digital literacy to students as a basic prerequisite for developing adaptive abilities to participate in the global digital society, to benefit from the industrial revolution of the digital economy, and to gain new opportunities for work, innovation, and creativity (Öncül, 2021). Meanwhile, learning management must develop students' abilities to apply new technologies, which will help students develop a revolutionized industry based on social change (Lwande et al., 2021; Raza et al., 2021). For digital literacy, universities must make students' habits and culture access various information through the internet. For technological literacy, universities can introduce and understand the latest technology for students relevant to their majors and the world of work (Lestari & Santoso, 2019).

The fourth step is the quality of human resources. In improving the quality of human resources (lecturers) must interact more with information technology. The accounting department needs specially qualified lecturers who understand the technical aspects of accounting and information systems.

Especially when the industrial revolution 4.0 has really been realized, the department's HR development will be related to digitalization, internet of thinking, automation, artificial intelligence, personalization, information technology performance, e-distribution, e-shopping, and big data (Sima et al., 2020). Lecturers must possess five competencies to face industrial revolution 4.0: environmental competence, continuous improvement, organizational learning, information and technologies (ICT), and innovation management (Kowang et al., 2020). In addition, the accounting study program must also prepare its graduates with soft skills in facing the industrial revolution 4.0. The concept of combining digital technology and internet with conventional industry which ultimately aims to increase productivity, efficiency and reduce the number of unemployed significantly in the era of industrial revolution 4.0.

Next the fifth step is the provision of laboratories. Regarding laboratories, the University must provide laboratory supporting infrastructure facilities. The government or education providers must invest in infrastructure development, human resources, the financial capacity to develop the education system in the face of the industrial revolution 4.0 (Kaban & Setyawati, 2020). In the industrial revolution 4.0 era, technology is the main thing because it is related to 1) internet use; 2) creative thinking; 3) social interaction. The use of the internet is the main means of the learning process. Creative thinking is a way to be able to think "out of the box" in solving problems. Social interaction is a team ability needed in jobs in the community (Maria et al., 2018).

The last or sixth step is partnership. Interaction or partnership between the world of higher education and the world of business and industrial revolution is a necessity that must always be done. Synergy and harmony between universities and the industrial revolution are necessary for realizing the achievement of the 4.0 industrial revolution in Indonesia. The triple helix concept in the Ministry of Education and Culture can deal with the 4.0 industrial revolution. The idea is a collaboration between universities, the industrial industry, and the government. In the triple helix concept, all parties are interconnected and contribute to the needs of others. The Triple Helix actors (intellectual, government, business) significantly affect innovation ability and competitive advantage (Ferreira & Steenkamp, 2015; Gamidullaeva et al., 2019). Likewise, innovation and competitive advantage also have a significant effect on performance.

For students, in facing the industrial revolution 4.0, they must be able to develop their hard skills and especially their soft skills. Because some of the competencies needed by students in facing the industrial revolution 4.0 rely more on soft skills such as critical thinking, creative thinking, being able to coordinate with others, being able to control emotions, and being able to negotiate. This ability is obtained more outside the classroom by participating in extracurricular activities, being actively involved in student organizations, and other activities that are beneficial to students (Tan et al., 2022). Activities in the classroom are more about honing hard skills such as compiling financial reports, calculating cost of goods sold, calculating taxes. However, participating in extra activities or being active in student organizations will hone students to be able to express and defend ideas, think creatively and innovatively, be able to work in groups, improve leadership, and have broad associations. Students can also use information and communication technology to learn many things about learning, creativity, and entrepreneurship (Chulvi et al., 2017; Gómez-Trigueros et al., 2019).

4. CONCLUSION

The emergence of the industrial revolution 4.0 phenomenon was taken seriously by the manager of the accounting department. This is due to the threat of the loss of several jobs in the accounting field, which is replaced by technology and information. The readiness of the accounting department manager and the implementation of curriculum 4.0 is carried out in several stages, namely adjusting the graduate profile, redesigning the curriculum, changing learning methods, improving the quality of human resources, improving laboratory infrastructure, and establishing partnerships with stakeholders. Recommendations for accounting department courses in the 4.0 industrial revolution curriculum are database management, accounting, and business application programming, accounting system and database analysis, accounting and business application projects, accounting system and database analysis, web and android application accounting system design, computers financial accounting, public sector accounting computers, computer auditing. Suggestions for further research are the use of quantitative methods or mixed methods in order to have other wider benefits. Suggestions for department managers are that the implementation of the industrial revolution 4.0 curriculum must pay attention to the real conditions of the department concerned because it will definitely differ from one department to another. The implication of this research is that the accounting study program has guidelines for implementing the industrial revolution 4.0 curriculum.

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