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Opportunities and challenges faced by State Islamic Tertiary Education Institutions in 4.0 Industrial Era

A. R. Muhammad[a] | Suhaimi[b] | Teuku Zulfikar[a] | Sulaiman[c]

[a]Department of English Education, State Islamic University (UIN) Ar-Raniry, Aceh, Indonesia.
[b]Department of Arabic Education, State Islamic University (UIN) Ar-Raniry, Aceh, Indonesia.
[c]Departmen of Islamic Religious Education, STAI-PTIQ Aceh and State Islamic University (UIN) Ar-Raniry, Aceh, Indonesia.

Abstract This research aims at understanding opportunities and challenges faced by State Islamic Tertiary Education Institution in Indonesia's industrial revolution 4.0 era amidst the COVID-19 pandemic and the transition to new normal. This is a qualitative research involving 46 informants, consisting of stakeholders in Islamic Tertiary institutions. The data were collected through interviews, observation and documentation. The data analysis were implemented through reduction, display data, and conclusion drawing/verification. The result of this research shows that the Islamic higher education institutions still experience challenges in the industrial revolution 4.0 era: lack of human resource, administrative staff's lack of ability in using technological devices, and insufficient infrastructure to support the teaching process. However, industrial revolution 4.0 has opened new opportunities for the development of the tertiary institutions, in terms of its institution status changes from State Islamic Institution to State Islamic University, including the establishment of faculty of science and technology relevant to the current job market. In addition, during the Covid-19 and new normal era, the teaching process was based on online infrastructure, which was the characteristic of industrial revolution 4.0. The strategy to uplift the quality of Islamic higher institutions was conducted by enhancing the lecturer's competency, implementing the National Qualification Framework for Indonesia curriculum, developing the technology facility for teaching, and establishing the *Ma'hadA'ly (Higher learning)* program.

Keywords: industrial revolution 4.0, opportunity and challenge, college, Covid-19

1. Introduction

The industry 4.0 era is a phase of digital technology development and an integrated internet network (Cogollo-Flórez 2022; Robandi et al 2019). The phase occurred through the fundamental changes in working and daily life, as the enhancement of information technology integrated every day and digital life, which affected every discipline (Catal and Tekinerdogan 2019). The rapid advancement of information technology includes artificial intelligence, a computer-based technology that adopts human intelligence into an application, and resulted in automatic information processing technological products (Benešová and Tupa 2017).

"The digital revolution" and "technological disruption era" are other phrases of the industrial revolution 4.0. It is coined as a "digital revolution" because of the proliferation of computers and record automation in every field. Meanwhile, the phrases "technological disruption era" refers to the automation and connectivity in a certain field, which makes the industrial mobility and competition no longer (Bloching et al 2015). One of the unique indicators of industry 4.0 is the application of artificial intelligence. It is applied through a robot to replicate human labor; thus, it will be cheaper, much effective, and efficient. Such technological progress has made possible the future of automation in every field of industry. New approach and technology that integrate the physical, digital, and biological domain will fundamentally change the way people live and interact. For examples, the use of gadget by the children and students, online learning, and behavioral changes for students.

Another advantage of the industrial revolution 4.0 is that most jobs are conducted with a strong base on the internet (Jasperneite 2017; Wollschlaeger 2020). Additionally, the industrial revolution 4.0 is indicated by the automation system for nearly every aspect of human life, enabling not only people to be connected worldwide, but also a basis for online trade and transportation (Johnstone and Kivimaa 2018; Kusumaningputri and Widodo 2018; Schlingensiepen 2016; Svitek 2016). Such progress also comes with social change. In terms of education, particularly in the State Islamic higher institution (Islamic Tertiary Education Institutions), the industrial revolution 4.0. demands for reform of management system based on digitalization and technology to elevate education quality and teaching effectiveness (Muhammad et al 2020).

The era of industrial revolution 4.0 presents the challenge and opportunity for humankind in general, and the Indonesian society in particular. The challenge experienced by a country amidst this era are among others: the appearances of resistance

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towards demographic and social aspect changes, political instability, limited resource, natural disaster risk, and a call for an environmentally friendly technology practice (Horc 2014). Another aspect that should also be considered is the technological gap between the current and the expected conditions of the 4.0 industry (Qin et al 2016). The next challenge would be the reluctance of corporate to apply 4.0 industry measures due to the fear of its uncertain benefit.

In general, five big challenges will be faced in the era of industrial revolution 4.0, i.e. education, technology, economy, social, and politic (Weyer 2015). Addressing those challenges requires a serious effort that is well planned and strategic from the government, academics, and practitioners. The involvement of academics in producing research to advance knowledge in dealing with challenges of progress is necessary.

It should also be considered that the roadmap for technological development to establish the 4.0 industry is not yet well directed because the very idea has not manifested in a clear form; therefore, it could lead to many possibilities, both as challenges and opportunities.

In responding to the 4.0 industrial revolution's challenge, Islamic Tertiary Education Institutions in Indonesia has created a development program and human resource management for the lecture to improve its education quality. The improvement of education quality in Islamic Tertiary Education Institutions is one of the strategies to upgrade the education quality. Therefore, Islamic education quality must be expanded holistically and integrally to build a competent education sector (Fery Fahrudin Yunus 2016; Novikasari 2019). According to one research, 60% of higher education quality is determined by its lecturers' competence, particularly on the teaching process, research, and community service. This is similar to the notion that education quality is very much shaped by the quality of its educators (Manning 2019). Besides, the advancement of its supporting facility also affected the education quality in Islamic Tertiary Education Institutions. It is also the case for the enhancement of technology that is a primary facility in developing higher education quality (Pacheco et al 2020).

Islamic Tertiary Education Institutions in Indonesia is dealing with the challenge of carrying out the era of industrial revolution 4.0. Such statement is aligned with the information given by the following correspondents: Syaifuddin, dean of Teachers College Department in State Islamic University Syarif Kasim, Riau;

Welcoming the industrial revolution era 4.0 State Islamic universities in Indonesia, especially the Education and Teacher Training Faculty of UIN Syarif Kasim Riau, is still experiencing challenges, in the form of some lecturers still lacking competence in mastering learning technology so that development is needed to support a quality learning process. Another challenge is that the facilities are still lacking and are being developed in stages (Dean).

Similar challenges were also echoed by the Faculty of Education and Teacher Training at IAIN Padangsidimpuan.

One of the challenges faced at the Faculty of Education and Teacher Training IAIN Padangsidimpuan is that there are still not enough lecturers with doctoral education, generally lecturers currently have master's degrees. This condition is certainly a challenge for improving the quality of education in the era of the industrial revolution 4.0 so that it needs to be supported by policies from leadership elements to support the development of lecturer competencies through doctoral programs. The learning facilities at the faculty are also not adequate and are in the process of being gradually developed (Dean).

In addition to Islamic Universities and Islamic Institutes of Religion which are under the Ministry of Religion of the Republic of Indonesia, there are a number of State Islamic Colleges which are still facing challenges in welcoming the industrial revolution era 4.0, as experienced at the State Islamic College.

The State Islamic College, Teungku Dirundeng Meulaboh, Aceh, Indonesia also has a lot to do to answer the challenges of the industrial revolution era 4.0. This campus is still in a new category so there are still many shortcomings and weaknesses, both lecturers and education staff, lack of learning buildings, and other supporting facilities. However, to support the development of the quality of education in the era of 4.0, several programs have been carried out, such as training on the use of technology, foreign languages for lecturers and education staff (Dean).

The information above are preliminary study which are explaining something occurring in the filed and it can a research foundation for any researcher. Also, these are very valuable information for any researcher who is going to the field.

They specified a variety of challenges, among others, the quality of human resources in teaching, the lack of capacity in the technology-related skills of its lecturers, low pedagogy competence, and insufficient education/technological facilities to support the teaching process. Such challenges have become a setback for Islamic Tertiary Education Institutions to succeed in the era of industrial revolution 4.0 and have implications for the institution's low quality.

Another problem that becomes a burden for Islamic Tertiary Education Institutions amidst the industrial revolution 4.0 is the fact that there are many unemployed Islamic Tertiary Education Institutions graduates due to among others their inadequate capability to perform as required to the available workforces in the current industrial schemes. To tackle such a problem, uplifting the quality of Islamic Tertiary Education Institutions should be prioritized so that their graduates could manage various challenges in the industrial revolution 4.0. In general, those are the underlying problems encountered by Islamic Tertiary Education Institutions in Indonesia during the transition from analog to digital industry.

Islamic Tertiary Education Institutions in Indonesia should have educated professional lecturers as the main human resource in the 4.0 industry that could perform well in using technology to support the advancement of teaching quality. In addition, a sufficient technology facility must be supported to build a relevant teaching system so it could result in skilled graduates from Islamic Tertiary Education Institutions. Due to such concerns, this research seeks to analyze further about the

given issue. In addition, this study also tries to understand whatever opportunities and challenges faced by the Islamic Tertiary Education Institution in Indonesia nowadays.

2. Literature Review

Revolution means drastically change, the change that occurs quickly (Pham 2021). Industrial Revolution 4.0 era is the fourth generation after the first industrial revolution called Industrail Revolution 1.0 in 1784 marked by the use of steam engines, the second called Industrial Revolution2.0 in 1870 was marked by mass production of electric power/fuel machines, the third called Industrial Revolution 3.0 marked by information technology and automatic machines, and fourth characterized by an internet integrated engine.

The Industrial Revolution 4.0 was introduced by Prof. Klaus Schwab, a world-famous German economist, founder and executive chairman of the World Economic Forum (WEF) who introduced the concept of the Industrial Revolution 4.0 in his book entitled "The Fourth Industrial Revolution". He explained that the Industrial Revolution 4.0 has changed lives and fundamental human work. Unlike the previous Industrial Revolution, the 4th generation industrial revolution has a wider scale, scope and complexity. New technological advances that integrate the physical, digital, and biological worlds have affected all disciplines like economics, industry, government, and education. Many fields that have experienced the Industrial Revolution 4.0 breakthroughs thanks to new technological advances. The fields include; (1) artificial intelligence robots, (2) nanotechnology, (3) biotechnology, and (4) quantum computer technology, (5) blockchain (such as bitcoin), (6) internet-based technology, and (7) 3D printers.

Technological advances in the era of the Industrial Revolution 4.0 have realized a transformation towards improvement by integrating the online world and production lines in industry, where all production processes run with the internet as the main support (Yuhasriati et al 2020). The era of the Industrial Revolution 4.0 also has implications for the education management system at Indonesian Islamic Higher Education (IIHE), currently the information system and administrative processes have been processed digitally and the internet is the main support.

So many researches had been done in the world related to the influence of industrial era such as the research done by (Butt et al 2020) in Pakistan. This research was focusing on the factors that affect the level of motivation toward the integration and implication of Industrial Revolution (IR) 4.0. The finding of this research was cloud storage, using the internet of things, cyber-physical system and artificial intelligence. The result of the research can support and strengthen this article.

The era of Industrial Revolution 4.0 with technological developments has contributed positively to the development of the religious education system in Indonesia. In addition, it also raises complex challenges, such as:

1. Information technology security that targets the world of education.
2. Reliability and production machines.
3. Lack of adequate skills.
4. Reluctance to change stakeholders.
5. Loss of a lot of work due to automation.
6. Stagnation in the use of technology, information, and communication.
7. The curriculum is not strength enough to support the demand of educational need of 21st century.

To anticipate the above challenges, it requires serious attention of all education stakeholder at Islamic higher education to make all needed adaptation such as improving lecture's quality, education administrators' capability, and students' knowledge and skills that is in line with Industrial Revolution 4.0 (Celarta and Esponilla 2021). Industrial Revolution 4.0 does not only challenge the educational processes, but also it gives many new opportunities to Indonsian Islamic Higher Education (IIHE) in upgrading the capacity of all its departments or study programs to meet the demand of market and the needs all stakeholders. The program to improve department quality is intended to respond the challenges of Industrial Revoltion 4.0.

Industrial Revolution open the door of many future opportunities in nurturing the Indonesian education and culture. IIHE has a strategic role in improving Islamic knowledge and sciences. The era of Industrial Revolution 4.0 give a big opportunies to Indonesian as the future knowledge centre and IIHE as the responsible institutes. The oppotunities can be seen in the following Figure 1.

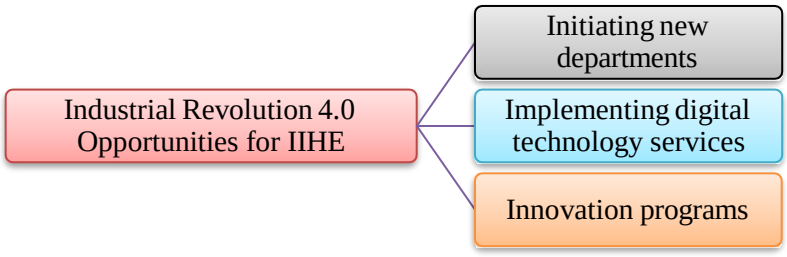

Figure 1 Industrial Revolution 4.0 Opportunities for IIHE.

IIHE is expected to respond the demands of Industrial Revolution 4.0 with various relavant program that is currently needed. The programs can be, firstly, initiating new department that is needed in job market, secondly, implementing digital technology services to provide easily accessed information for students and society, thirdly, new products and services that are contributed by researches. Improving technological literacy and foreign languages among students are crucial to be able to face the challenges of Industrial Revolution 4.0, including the ability to communicate in English and Arabic. IIHE may also develop various relevant programs to prepare competent students to take a role in Industrial Revolution 4.0.

Anyway, before preparing students, the development of lecturer's ability particularly in using educational technology is more important to prepare (Teo et al 2021). It is impossible to produce the smartest and cleverest students if not supported by the technological competence of lecturer. Therefore, every lecturer in the Islamic Tertiary Education Institution must be completed with technological competence in education for facing Industrial Revolution 4.0.

3. Method

This is a qualitative research which is based on post-positivist, in which the researchers' role is instrumental. Data gathering is conducted through purposive, while the analysis is inductive and tends to highlight the *meaning* (Creswell 2018; Sugiyono 2011; Walidin 2015).

The research was carried out in three Islamic Tertiary Education Institutions in Indonesia, involving three rectors, nine vice-rectors, three deans of Teacher College, and 46 lecturers and program directors (informants). They were selected because they were responsible, experience and knowledgeable and could be giving accurate information related to this research. Data was collected through interviews, it was done unstructurally. Before interview tookplace, the researcher made an appointment with informants when and where to meet them. Then the researcher did observation, and document analysis. It took one year (2020) to collect data and to finish writing the report.

The data collected through interview are related to challenges, learning facilities, human resources, and strategy to develop the Islamic Tertiary Education Institutions. The data observed were internet connection and learning process. Then, the data from document were human resources, administrative staff, and Indonesian system of entrance test in Islamic Tertiary Education Institution. The data analysis technique was implemented through three steps, they are; data reduction, display data, and conclusion drawing/verification (Miles and Huberman 1994).

4. Results

The era of industrial revolution 4.0 has implications for changes in nearly every aspect of social system: politics, economics, and education. This era also encourages the reform in the education system of Islamic Tertiary Education Institutions in Indonesia to take place. This is so because the higher institutions should also need to prepare themselves to contribute significantly in technological sophistication of modern Society. One of the challenges faced by Islamic Tertiary Education Institutions is the quality of its graduates that could not fit with the need of industrial stakeholders. Many employment opportunities could not be achieved due to the limited technological expertise (Ahmad and Wan 2019; Alaloul et al 2020).

According to the research results, Islamic Tertiary Education Institution graduates from three institutions being researched, such as State Islamic University, State Islamic Institute, and State Islamic Higher Education in Indonesia, particularly those from Faculty of Teacher Training and Education who are employed as teachers, have low competence on using technology for teaching. This should be noted as one of the challenges faced in the industrial revolution 4.0 (Alaloul et al 2018; Harahap 2019). Thus, Islamic Tertiary Education Institutions is currently preparing its students to have knowledge and expertise in technology, as needed by most employment requirements in this era (Kusumaningputri and Widodo 2018). It is indeed important to build higher education with the curriculum relevant to the demand of modern society (Vodenko et al 2019).

Reviewing the research result from State Islamic University of Syarif Kasim Riau, State Islamic Institutions Padangsidimpuan, and State Islamic Higher Education College Dirundeng Meulaboh, we could see that Islamic Tertiary Education Institutions in Indonesia is dealing with similar challenges in the era of industrial revolution 4.0, such as: (1) Inadequate lecturers' competences in using relevant teaching technology in the digital era. The lecturers should then be equipped with technological skills for teaching purposes, hence the learning process could be more effective, and the education quality could be upgraded, (2) Other teaching assistants and staff working in the administrative domain to support the teaching process also have a low technological skill, which affected the service quality. This point is also one of the challenges encountered by Islamic Tertiary Education Institutions in Indonesia, (3) The technology infrastructure and facility in most Teacher Colleges in Islamic Tertiary Education Institutions in Indonesia are still limited. However, for some institutions, the infrastructure and facilities are already adequate. The technological facilities found in the Teacher College Department of Islamic Tertiary Education Institutions is a projector that is only used by a few lecturers during the teaching session. Meanwhile, other facilities, such as a sophisticated laboratory, are uncommon for the Teacher College Department of Islamic Tertiary Education Institutions in Indonesia. The lack of laboratories for technology is one of the obstacles to build a high-quality learning environment, and (4) Mobile technology (slow internet network) is also holding up the teaching process in the Teacher

College Department of Islamic Tertiary Education Institutions in Indonesia. Internet networks the key to provide effective digital learning sessions. Yet, there are many Teacher Colleges that are not up to this standard.

Aside from various challenges presented by the industrial revolution 4.0, there are also new opportunities for Islamic Tertiary Education Institutions in Indonesia, for instance: (1) The new degree program is open to fulfill job demands relevant to the industrial revolution 4.0, such as Information Technology, Environment Technology, Architecture, etc. However, the main difference between similar degree programs outside of Islamic Tertiary Education Institutions is its reference to an Islamic context, and (2) The changing status, from State Islamic Higher Education College to State Islamic Institution, and from the State Islamic Institution to State Islamic University, is an effort made by the Indonesian Government to support knowledge production and development in Islamic Tertiary Education Institutions during the digital era.

The effort to enhance the teaching process in the Teacher College Department of Islamic Tertiary Education Institutions in Indonesia is needed to provide e-learning throughout the COVID-19 pandemic. Due to the pandemic, the learning process could not normally perform, the Ministry of Education and Culture, along with the Ministry of Religious Affairs, Ministry of Public Health, and Ministry of Interior Affairs decided to issue a policy to "Study from Home" (SfH), for the Academic Year 2020/2021.

The abrupt transition from analog to digital learning causes many stumbling blocks. According to the information given by rectors and dean of the Teacher College Department of Islamic Tertiary Education Institutions, the main problem is the incompetence of lecturers on operating technological equipment for the teaching process. Therefore, many lecturers experience difficulty during e-learning sessions. Besides, a slow internet network also contributes to the low number of participating students through e-learning, particularly those who live in remote areas. Nonetheless, in general, the higher education learning process in Islamic Tertiary Education Institutions in Indonesia during the COVID-19 pandemic went by smoothly. Technological development is an appropriate solution to tackle the issue of learning in difficult times, such as in the COVID-19 pandemic (Baena et al 2017; Mourtzis et al 2018).

5. Discussion

5.1. Challenges Faced by Islamic Tertiary Education Institutions in Indonesia in 4.0 Era

The industrial revolution 4.0 poses a vast challenge for the current Society. The challenge is caused by rapid technological development, which could abolish many jobs that robots could replace. In the future, most jobs could be performed using technology and control systems. Industrial revolution 4.0 is related to artificial intelligence and autonomous robotic. Artificial intelligence is a mechanism to adopt human intelligence; thus, a computer could imitate it. By having this artificial intelligence, humans could have assistance in dealing with various problems or difficult environmental issues. An autonomous robotic is a robot that could do any task without guidance from a human. Such a robot could function in land, air, and water to help human jobs. In this modern era, citizens across the nation should be equipped with technological skills. Therefore, lecturers and teaching staff in Islamic Tertiary Education Institutions should prepare themselves by developing expertise in various technological and digital works.

The industrial revolution 4.0 has replaced and change the system in the education sector from analog to digital. The same goes to the education system in Islamic Tertiary Education Institutions in Indonesia; nearly all administrative process and learning session are done through technology to participate in the progress of industrial revolution 4.0. Therefore, technological advancement and digitalization are very helpful in improving Islamic education in Islamic Tertiary Education Institutions, including the learning process during the COVID-19 pandemic, which is done through e-learning.

The phenomenon of industrial revolution 4.0 poses a challenge for Islamic Tertiary Education Institutions in Indonesia, in terms of providing a necessary skill relevant to the current era. However, university presidents have already made efforts to develop and improve the quality of universities, improve its facility, technology, and upgrade lecturers' competence to achieve a better education quality so that Islamic Tertiary Education Institutions in Indonesia could grapple challenges of the industrial revolution 4.0.

Challenges of Islamic Tertiary Education Institutions in Indonesia vary. Each institution comes at different problems. These findings refer to the data from the interview with university president, leading figures, and lecturers who work in Islamic Tertiary Education Institutions in Indonesia.

Rector of State Islamic University Sultan Syarif Kasim Riau, for example mentioned that the digital era's common problem is the low level of the learning process, since lecturers have not conducted teaching session effectively. He also elaborated other problems, such as the need to advance technological facilities and support lecturers who are not used to computer that hindered them in teaching tech-savvy students (Dean).

A similar obstacle was also stated by the rector of State Islamic Institution Padangsidimpuan as the campus infrastructure is still very average and currently undergoing a renovation to attain an effective learning process. He added other obstacles are a slow internet connection and teaching facility that still needs to be improved. This statement is supported by the explanation by the first vice-rector, which touches on the learning building that is still on the renovation while many

academic programs are being offered. He said that new academic courses*, ma'had*, are provided for students to strengthen their technological skills (Dean).

The industrial revolution 4.0 not only brings challenges to Islamic Tertiary Education Institutions in Indonesia, such as State Islamic University or State Islamic Institution, but also to State Islamic Higher Education College, such as those of Teungku Dirundeng Meulaboh in Aceh Province.

The challenge is visible in the national online student recruitment, which on the one hand, is good because of its efficiency, but on the other hand, it's difficult to give specific tests such as Qur'an recitation for prospective students (Dean).

The aspect of learning technology is also a hindrance to State Islamic Higher Education College. This occurred because there is no adequate technological facility to build an online teaching system. As the campus couldn't provide such a facility, lecturers are the ones who supply the necessary facility to achieve improvement of learning quality. The given information is supported by observation (2020) conducted before the COVID-19 lockdown in Indonesia, in which most lecturers brought their own technology to bolster the teaching process. The information gathered in this research shows that Islamic Tertiary Education Institutions in Indonesia (UIN, IAIN, and STAIN), in general, encounters five challenges in carrying out the industrial revolution 4.0. It can be said that those challenges are; human resource (lecturer), administrative staff, Pattern SPAN-Islamic Tertiary Education Institutions, facility, and internet connection.

5.1.1. Education/Learning Facility in Islamic Tertiary Education Institutions

According to the gathered information, nearly all Islamic Tertiary Education Institutions in Indonesia has a limited facility, such as building for the teaching Process and Laboratory. Only some Islamic Tertiary Education Institutions had proper facilities, such as UIN Sultan Syarif Kasim Riau. However, other Islamic Tertiary Education Institutions, such as IAIN Padangsidimpuan and STAIN Teungku Dirundeng Meulaboh, do not have good facilities and still in development stages.

The given limitation becomes one of the challenges in advancing education quality in Islamic Tertiary Education Institutions and in welcoming the era of industrial revolution 4.0. Nevertheless, the university presidents and leading figures in each institution are working towards improvements. Laboratory and technological facilities must be effective in supporting the teaching process (Grodotzki et al 2018). By that, technology facility development is the priority to enhance education quality in Islamic Tertiary Education Institutions in Indonesia.

5.1.2. Human Resource (Lecturers)

Lecturers are an important component in higher education learning (Bentley and Pegram 2003; Shibankova et al 2019). Every higher education institution must have qualified lecturers with a relevant degree. Lecturers in Islamic Tertiary Education Institutions generally hold a postgraduate degree, and it is still very rare for them who have a doctoral degree. This aspect should be considered a hindrance to advancing the quality of education quality in Islamic Tertiary Education Institutions in the digital era. Hence, to resolve such an issue, it is necessary to have more lecturers to continue their study through scholarships from the Ministry of Religious Affairs so that their competence could be developed and later contribute to improving Islamic Tertiary Education Institutions' quality.

5.1.3. Administrative Staff

Administrative staffs in the universities help and provide administrative services to support the learning process. They also play a decisive role in higher education institutions. Thus, administrative staff should also have competence in technological matters so they could give the finest service.

Interviews with leading figures in State Islamic University Sultan Syarif Kasim Riau, State Islamic Institution of Padangsidimpuan and State Islamic Higher Education College Teungku Dirundeng revealed that only some administrative staff already had the technological competences. This aspect is also an obstacle to build a better education institution. The solution for those issues is to provide training and education for staff advancement purposes.

5.1.4. Internet Connection

Digitalization system and internet connection is a sophisticated technology in the era of industrial revolution 4.0 that impacts the labor system, including education (Ghobakhloo 2020). The gathered information in Islamic Tertiary Education Institutions in Indonesia shows that the learning service system in each institution already uses technology and internet connection. The learning service system is performed through an internet connection, although each institution experience troubleshooting, which affected the learning process and service. All in all, those are challenges experienced by lecturers in the teaching process in several Islamic Tertiary Education Institutions in Indonesia.

Technology and internet networks are crucial in the 4.0 era (Wollschlaeger 2020), especially in the learning process and educational service, for students and the public to access information and conduct learning processes at Islamic Tertiary Education Institutions. Therefore, to meet these needs, State Islamic higher institutions: universities, institutes and colleges in

Indonesia have attempted for technology and internet networks to be provided free of charge for students to support an effective learning process.

5.1.5. SPAN-Islamic Tertiary Education Institutions System

The regulations of Islamic Tertiary Education Institutions student admission refer to Law Number 12 of 2012 concerning Higher Education, and the Republic of Indonesia Government Regulation Number 4 of 2014 concerning the Implementation of Higher Education and Management of Higher Education. Both establish the regulation of new student admissions to UIN/IAIN/STAIN in Indonesia implemented nationally and in other forms. The national selection for UIN/IAIN/STAIN is called the National Academic Achievement Selection of State Islamic Higher Education Institutions (SPAN-Islamic Tertiary Education Institutions). Another form of selection carried out jointly by state Islamic higher education is called the Entrance Tests of, both selections are followed by prospective students from all over Indonesia regardless of gender, religion, race, ethnicity, social class, and level of economic.

This particular entrance test is seen to have its advantages and disadvantages. One of the advantages is of the test is in its possibility to potentially admit outstanding students. While the shortcoming of the test is in its inability to detect student who are competent in reading the Qur'an, which is one of the characteristics of Islamic Tertiary Education Institutions in which students must be able to read the Qur'an. However, overall, new students-admission through this particular test system in Indonesia is already appropriate and relevant with the technology of the industry revolution 4.0 era, where the student admission system is carried out on a national scale and uses technology. In addition to the five challenges, Islamic Tertiary Education Institutions lecturers also experienced challenges, as in Figure 2.

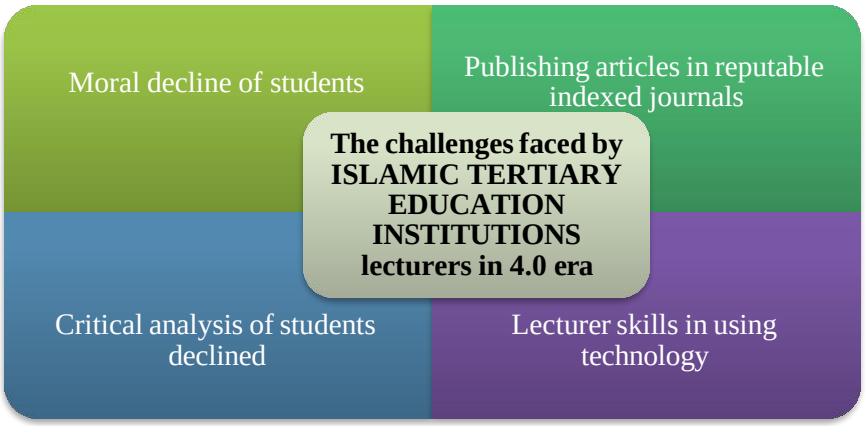

Figure 2 The challenges faced by Islamic Tertiary Education Institutions lecturers in 4.0 Era.

The era of the industrial revolution 4.0, marked by technological sophistication and digitalization, this however give an impact on lecturers' work who served at Islamic Tertiary Education Institutions in Indonesia, especially towards the implementation of *Tridharma Perguruan Tinggi* (Three Pillars of Higher Education comprising Education, Research and Community Service). The challenges and complaints of lecturers have been about the obligation to publish articles in reputable and indexed international journals and some other challenges as described in Figure 2.

5.2. Islamic Tertiary Education Institutions Opportunities in the 4.0 Era

The era of the industrial revolution 4.0 offers great opportunities for the advancing of Islamic Tertiary Education Institutions in Indonesia. For instance, UIN Sultan Syarif Kasim Riau develops new faculties or colleges and departments and prepares for a world-class university.

The development of faculties and study programs at UIN Sultan Syarif Kasim Riau is accomplished to take advantage of opportunities offered by the industrial revolution 4.0 and prepare graduates to have skills relevant to workforce demands or stakeholders. The development of study programs also continues to increase at State Islamic Institute, for example at State Islamic Institute of Padangsidimpuan, the Faculty of Teacher Training and Education currently has developed ten (10) study programs, including Chemistry Education, Physics Education, Biology Education, and other study programs. The new study program was opened to accommodate the interests of students and following the needs of the industrial revolution 4.0.

The head of State Islamic College of Teungku Dirundeng Meulaboh, Aceh, also responded quickly to the opportunities offered by the era of the industrial revolution 4.0, namely through; (1) Development of facilities, (2) Development of new study programs, and (3) English and Arabic training, and (4) Technology training for students and lecturers (Dean).

Those steps were implemented to produce quality graduates with skills relevant to the labor market in the 4.0 era. The information obtained shows that the industrial revolution 4.0era offers great opportunities for Islamic Tertiary Education Institutions (UIN, IAIN, and STAIN) in Indonesia. These opportunities can be seen in Figure 3.

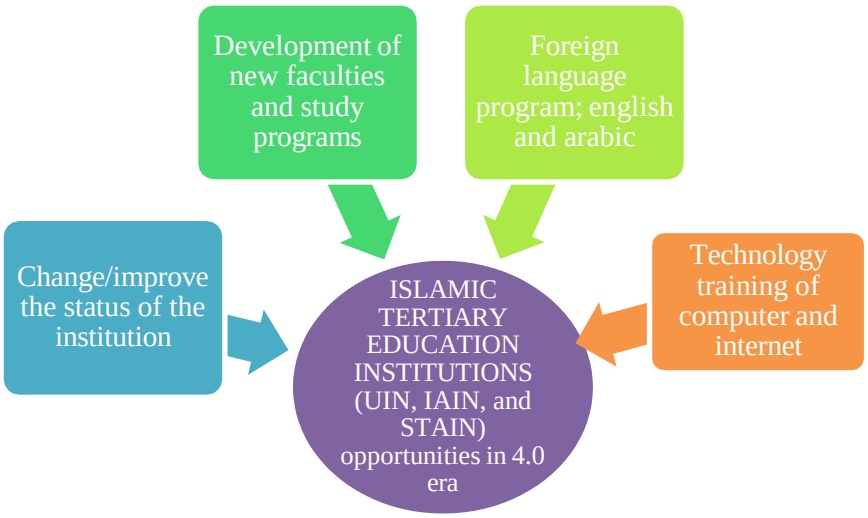

Figure 3 Islamic Tertiary Education Institutions Opportunities in 4.0 Era.

Islamic Tertiary Education Institutions (State Islamic University, State Islamic Institute and State Islamic Colleges) grasp opportunities in Indonesia in welcoming the industrial revolution 4.0 era, as mentioned in Figure 3, are elaborated in the following discussion:

1. Change in institution status. Changes in the status of higher education in the last five years within the Ministry of Religion have occurred on a large scale. Status changes have occurred from State Islamic colleges to State Islamic Institute and are then transformed in State Islamic University. The conversion in status has implications for the development of the Islamic Tertiary Education Institutions for the scope of scientific studies. The conversion in status from State Islamic Institutes to State Islamic Universities provides opportunities for the development of a variety of sciences (social science and science). Currently, State Islamic Universities in Indonesia have opened new faculties, such as the faculty of science and technology. The development is a strategy of Islamic Tertiary Education Institutions to welcome the 4.0 revolution era.
2. Study program development. Currently, almost all Islamic Tertiary Education Institutions, in Indonesia develop study programs or opening new study programs. The addition of a new study program is part of the preparation to welcome the era of the industrial revolution 4.0, which places more emphasis on the aspects of skills in technological mastery so that Islamic Tertiary Education Institutions graduates in addition to having competence in the field of professional expertise also have technology-related skills following the demands of the industrial revolution 4.0.
3. Foreign language programs (English and Arabic) were developed at Islamic Tertiary Education Institutions to improve student competencies in mastering foreign languages. The era moves quickly, and language is one tool to keep abreast of the times. The development of foreign language skills is a strategy undertaken by Islamic Tertiary Education Institutions to develop students' competencies, in particulars and lecturers to welcome the industrial revolution 4.0.
4. The technology training program was conducted for students and lecturers at all Islamic Tertiary Education Institutions in Indonesia to strengthen students' skills in computer technology, digitalization, and the internet to welcome the industrial revolution 4.0.

5.3. Challenges in the learning process during the new normal period at Islamic Tertiary Education Institutions

The Covid-19 pandemic has paralyzed almost all aspects, including education (Chick 2020; Kreisman and Stange 2020). Learning process at Islamic Tertiary Education Institutions in Indonesia during the COVID-19 carried out by Learning at Home (BDR). It is performed over long distances learning without face to face learning in the classroom (Acuña-Zegarra et al 2020; Erduran 2020; Gostin and Wiley 2020; Viner et al 2020). The learning process uses technology as a step to avoid physical contact (Hellewell et al 2020). It is done online using technology in accordance with the sophistication of the industrial revolution 4.0 era.

The distance learning process at Islamic Tertiary Education Institutions in Indonesia is still going on until the new normal period. The Government of Indonesia, through the Ministry of Religious Affairs of the Republic of Indonesia, issued a policy of the learning process with the Home Learning system during the Covid-19 pandemic and new normal period. This step is carried out, aiming to break the Covid-19 chain (Dean).

Challenges in the learning process experienced by students during the Covid-19 and new normal period are internet networks that have not been optimally connected to remote areas in Indonesia, especially for students living in these areas. This condition makes it very difficult for students to follow the learning process online. Besides, the economic factors that had

collapsed due to the Covid-19 pandemic caused the public, especially students, to find it difficult to buy internet packages that would be used for online learning.

The next challenge is the lack of lecturers' competence in using technology for learning. Based on interviews with the Chancellor of UIN, IAIN, and the Chair of STAIN, some lecturers still lack competence in using technology and are less familiar with online system learning. Difficulties in using technology could hamper the learning (Afrianto 2018). This factor causes the learning process to be constrained at the beginning of the Covid-19 pandemic, but over time the lecturers have learned to practice online technology with the result that all lecturers are already competent in it now.

Furthermore, based on lecturers' information, besides these challenges, other problems also arise in the online learning process. The problem is that the online learning process is less effective for the character-building process because students and lecturers do not meet face to face directly. Online learning has its advantages and disadvantages. One of the weaknesses is that it is less effective in students' character development. The aspects of attitudes, morals, and character are very crucial to be enhanced in students (Roy et al 2020; Syabuddin et al 2020). Concerning this issue, lecturers are expected to be able to use online facilities as learning media and, at the same time, to strengthen student character during the Covid-19 pandemic.

5.4. Strategy to improve the quality of Islamic Tertiary Education Institutions in the industrial revolution 4.0

Improving the quality of the Institutions is the key to thrive in the era of industrial revolution 4.0. Quality improvement is closely related to policies, commitments, and priorities of the development of higher education institutions (Chui et al 2016; Hakiman et al 2019). Islamic Tertiary Education Institutions in Indonesia, are demanded to enhance quality to increase education quality that is relevant to the needs of the industrial revolution 4.0 era. One aspect that needs to be improved is technology development. Based on the data obtained, generally, the quality improvement of Islamic Tertiary Education Institutions is undertaken through four strategies, as presented in Figure 4.

Figure 4 Islamic Tertiary Education Institutions Learning Quality Improvement Strategies in 4.0 Era 2020.

Competent lecturers are one indicator of quality education processes at universities of this kind (Sulaiman et al 2020). Leaders in each Islamic Tertiary Education Institutions, in Indonesia encourage lecturers to continue their education to doctoral level (S3) and give permission to continue their study. This pace was taken to prepare competent lecturers, which leads to quality education. In addition to formal education (Sharma and Raghuvanshi 2019), training programs (non-formal) or workshops are held annually at Islamic Tertiary Education Institutions to support the development of lecturer competencies. Some of the training carried out to improve the quality of education to welcome the industrial revolution 4.0 era, as follows;
a) Training for developing professionalism competencies, b) Training for preparing Semester Learning Plans (RPS), c) Training for developing modules, d) Training for utilizing technology, digitalization, and the internet. Training on developing article writing skills to be published in indexed and reputable journals.

Furthermore, the application of KKNI curriculum refers to the provisions of Presidential Regulation No. 18 of 2012 concerning KKNI and the Minister of Education and Culture Regulation of the Republic of Indonesia Number 73 of 2013 concerning the application of Indonesia's national qualifications framework in higher education. The application of KKNI curriculum is one approach to improving the quality of Islamic Tertiary Education Institutions (Idris et al 2020). The basis of the policy is that the universities (UIN, IAIN, and STAIN) in Indonesia, implemented KKNI curriculum to improve the quality of education. This curriculum is a strategy for improving the quality of education at Islamic Tertiary Education Institutions with the purpose of education quality in Indonesia is in line with the quality of education in developed countries.

Effective college facilities and management are one indicator of quality education (Bahman et al 2020; Bass 2018; King 2002; Sergeeva et al 2019). Based on information obtained, development of college facilities; building facilities, laboratories, and internet networks at each institution are still in stages of developing gradually to improve the quality of learning in welcoming the industrial revolution 4.0 era.

The *ma'had 'aly* program is one of the new and distinctive programs at Islamic tertiary education institutions in Indonesia. All students are required to attend the *ma'had* program, which is carried out almost the same as the *pesantren* system (Dean).

The *ma'had* program has enormous benefits for developing student competencies; thus, they have the skills needed in the 4.0 era. The student skills development programs carried out in the *ma'had* such as *tahsinul* Al-Qur'an and *tahfiz* programs, English and Arabic programs, and technology training for students. These programs strengthen students to face the challenges and opportunities of the industrial revolution 4.0 era (Wibowo et al 2020). Those are some of the strategies that have been undertaken to improve the quality of education At Islamic Tertiary Education Institutions in Indonesia.

6. Conclusion

Islamic Tertiary Education Institutions in Indonesia faces some challenges in the industrial revolution 4.0, especially in the new normal situation, including the internal and external problems of the institutions. The situation becomes of particular concern to the Islamic tertiary education in improving the quality of higher education in responding to global challenges that are influenced by technological and information advancements. The era of the industrial revolution 4.0 was marked by technological advances connected to the internet network. Several factors cause the challenges faced by State Islamic tertiary education in Indonesia including: (1) lecturers and educational personnel are still lacking of competence in using technology, (2) facilities are inadequate, (3) internet network technology is not optimal, (4) there are weaknesses in the admission of new students through the particular technique because the competency test of Qur'an reading was not conducted. Actually the use of technology for entrance test in Islamic Tertiary Education Institution can automaticly measure the students' ability in reciting al-Qur'an itself.

Besides the challenges above, the industrial revolution 4.0 era also offered opportunities for Islamic Tertiary Education Institutions in Indonesia to develop the status of the institution, open new faculties (such as faculty of science and technology) and establish new study programs relevant to the needs and workforce available in 4.0 era. Islamic Tertiary Education Institutions quality development is carried out by the following strategies: developing the lecturer competencies, developing technology, applying KKNI curriculum, and establishing the *ma'had 'aly* program. Next, the learning process at Islamic Tertiary Education Institutions during the Covid-19 pandemic and the new normal period is carried out online. Overall, the learning process has run effectively and successfully.

Apart from the above findings, the researcher recommends other researchers to pursue their research in case of online learning whether in the pandemic era or in normal era. Because this research did not focuse in online learning both in Covid-19 and new normal era. The research done was more focusing on opportunity and challenges for Islamic Tertiary Education Institution in industrial Revolution 4.0.

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Ethical considerations

Not applicable.

Conflict of Interest

The authors declare that they have no conflict of interest.

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