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Policy For Managing The Study Program in The Industrial Revolusion Era 4.0

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Abstract: The era of industrial revolution 4.0 is unavoidable to face. Education, in this case is higher education institution must begin to udjust to the changes that occur. Comprehensive changes are made strarting from policy maker (leader) or in the implementing strata which are lectures, employees, and students. Study programs as spearheads of policy implementers must be able to accomodate existing changes. Readiness of lectures and curriculum must be addressed and improved. Industrial revolution 4.0 that highly correlated with technology, must be able to utilized by all stakeholders. Changes to the management of study program policies, required a leader not to be too rigid in the implementation of learning process. Learning system has begun to change from the compartementalized to distance learning (online learning). Readiness of curriculum, infrastructure, human resources, facilities, and funds are an important things that requires speed in its implementation.

Keyword: industrial revolution 4.0., higher education, study program management policies.

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I. INTRODUCTION

The presence of the fourth industrial revolution era (Industry 4.0) is inevitable. Indonesia needs to prepare strategic steps so that it can be adapted to the era of the digital industry. The rapidly developing industrial development is now increasingly making higher education to prepare themselves for the results that need to compete in the real world. Humans will increasingly race to start the 4.0 industrial revolution that was first introduced by Davtos in 2016 in Germany, namely the Industrial Revolution 4.0 (4IR). The wave of innovation that is increasingly rolling, promoting digital technology, makes academics who are not ready to be increasingly marginalized, this is because many academics are not able to take advantage of changes that are loaded with this digital technology. Higher education as a preparation that prepares new personnel must improve with preparation and training to be able to compete through the 4.0 industrial revolution.

The inevitable reality of entering the revolution 4.0 is that human power is a secondary necessity that is replaced by engine power, this is because the power of the engine is considered more profitable than human power. Seeing this fact, universities require the preparation of graduates to be able to master various kinds of skills. As Made (2018) said (Satria 2018) that the characteristics of the RI era 4.0, namely big data, internet of things (IoT), cloud computing, and cognitive computing. All of these characteristics lead to the creation of a cyber physical system or which is known as robotization which began to be widely used in the industry. Later higher education has an educational goal of openness of mind, not in reference to tradition but in value.

Actually there is continuity between traditional life and modern life, and not everything is completely cut off. It has been widely known how misleading to contradict the two in a haphazard way. But the changes that have taken place over the past three or four decades, a very short historical period have been so dramatic and comprehensive that we only get a little help from our knowledge in the previous transition period in an attempt to interpret those changes (Giddens, 2009: 6).

This change occurs from a number of related elements. In the economic field, services increasingly replace the manufacturing industry as a source of welfare. Instead of working in steel or car processing companies, typical workers in the information community actually work in banks, software companies, restaurants, universities or social service agents. The role of information and intelligence, which is formed in increasingly intelligent societies and machines makes pervasive mental work tended to replace physical work. The production of globalization as inexpensive information technology makes it increasingly easier to act on information beyond national borders, and rapid communication through television, radio, fax, and e-mail removes the boundaries of long-established cultural communities (Fukuyama, 2007: 3 -4).

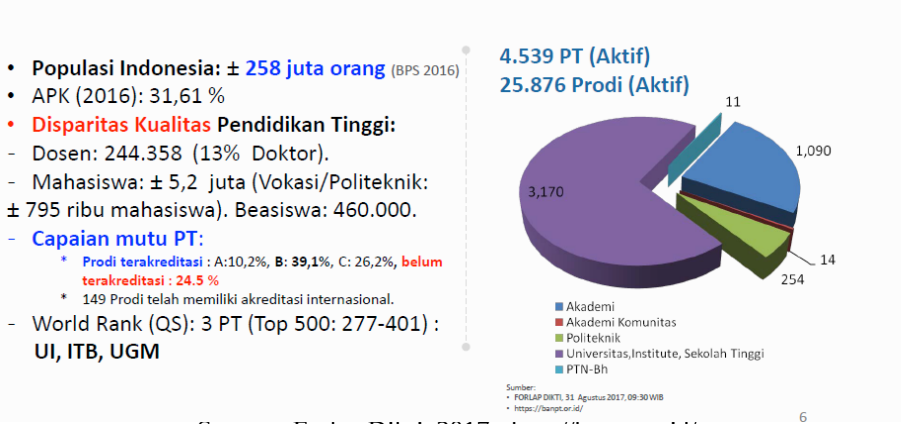
The industrial revolution requires industrial companies to demand changes in the marketing system. Today the industrial revolution is at its peak. Producers have reached all regions that previously only served the local market, but not with the present situation. Mass production changes it all. The market conception changed

completely because it had to reach consumers in a very wide area. The local market is served by a number of sellers, but the national market demands a completely different approach.

Where is the difference that must be prepared by universities now ? Higher education as an institution that prepares intellectual staff certainly does not only equip graduates with a static theory which later will not be able to do much with competition in the market. This is because the realm of reality is implementative, so changes in the educational paradigm must change. Educators need to prepare innovative learning techniques with a focus on knowledge production and innovation application of knowledge. So that later the relevance between education and employment (the quality of graduates and available jobs) is high. Graduates are expected to have competencies / skills that are in accordance with the profession being run, however this certainly cannot occur ideally, meaning that the company has full rights to the selection of energy needed by the company, but it is still done in a way that is selective in promoting quality.

If you look at the portrait of higher education in Indonesia now according to the 2017 Forlap Dikti data, namely:

Figure 1. Portrait of Indonesian High Education (Kemenristek Dikti)



Source : Forlap Dikti, 2017 : http://banpt.or.id/

This means that higher education mostly educates students actively, where these students are from generation Z. Generation Z is a generation that has a different behavior, namely demanding speed in everything. In this context, higher education must be prepared for changes in behavior of generation Z in the context of learning. The potential possessed by generation Z is very high, they are domains in virtual interactions, this means there must be a change in the teaching method. The systemic thing that happens is that the learning infrastructure must change, increasing computational capacity needs to be added, learning presence becomes distance learning (online learning), the learning process becomes more in the direction of personalizing learning. Change and readiness really must be done with business and programs and strategies with high commitment. Given that the Indonesian education system itself is actually still lagging behind and will make a very high leap to keep abreast of the new era that occurred in the era of industrial revolution 4.0.

What is a big problem in education in Indonesia is that most education in Indonesia still applies Education 1.0 (Pedagogy: children's learning), does not understand the transformation process towards Education 2.0 (Andragogy: adult learning) and Education 3.0 (Andragogy: adult learning using mobile learning) but immediately jumps to implementing Education 4.0 (Heutagogy: Self-determined learning) because the world has entered the Era of Industrial Revolution 4.0.

II. DISCUSSION

1. Opportunities and Challenges of Universities Facing The Era of Industrial Revolution 4.0

Higher education is an education organization that is relatively unlimited to develop itself to follow the developments that occur. Responding to the changes that occurred in the industrial revolution era 4.0 the biggest responsibility for bringing the current changes in the adjustment of a college is highly dependent on leadership in the university itself.

Why is the leader? why is leadership and not management ? because in practice, management is nothing but leadership (Haas & Tarmakin, 1992) in (Dwijowijoto, 2003: 282). Because only leader that can make a difference. Warren Bennis (Dwijowijoto, 2003; 282) there are three main reasons why leadership is important and necessary. First, because they are responsible for the effectiveness of the organization. Second, they are a place to take refuge, especially in difficult times. Third, leaders are at the core of institutional integrity.

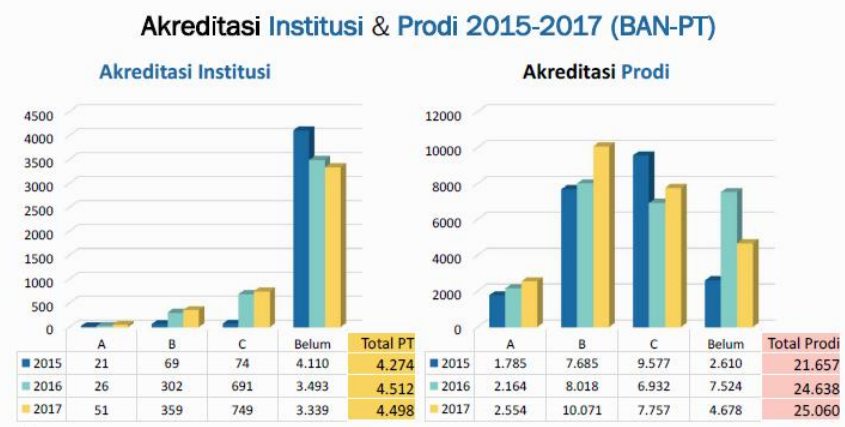
In every change that occurs then the inevitability of opportunities and challenges. Changes in the era of industrial revolution 4.0 bring its own opportunities for universities to be able to compete. Colleges need to look for a system and method for developing student cognitive capacity. As previously stated, the domination of the millennial generation (generation Z) in universities is a good capital, because this generation is very adaptive to the developments that occur. Therefore universities in this case must be able to improve the mental order of students' skills. Students must be triggered to be able to think critically and systemically. It is not easy to give up and be able to take advantage of existing opportunities, so it is not easy to give up and be able to survive in the competition in the era of industrial revolution 4.0. Students must have competitive abilities. Colleges must be able to facilitate skills to students by providing leadership skills (leadership) and being able to work in teams (teamwork). Universities must be able to provide education in a structured manner in agility and cultural agility, meaning that later graduates from different backgrounds must be able to also be able to work in different environments, not only locally, nationally, but internationally.

The connection with the soul that always has innovation and enthusiasm is not easy to give up in facing all obstacles, so the college provides the basic ability as an entrepreneur. Higher education as a place for the nursery of intellectual personnel needs to foster the spirit of entrepreneurship that is given during their time as students to eventually become alumni (graduates). Then the tri dharma paradigm of higher education must be aligned with the era of industrial revolution 4.0. this means that in terms of teaching must apply distance learning (online learning), e-learning facilities must be added to the infrastructure and teaching methods to students. In research, higher education establishes the widest network to conduct research in collaboration with universities widely and is not limited only to the country but with institutions abroad, both educational institutions and non-educational institutions. It is also in the interest of alumni cooperation in channeling cooperation in the field of work. Universities carry out humanities by utilizing technology, meaning that they are assisting the community to be able to use technology wisely, and how the community is able to improve financial capabilities by utilizing existing technology.

The thing that is often forgotten is that the media has also entered the study room. The inclusion of media technology in the educational space describing media technology has become part of the learning process. The invasive impact of new technologies, because technology has mastered the institutions and is the basis for the production of new meanings, new cultural expressions. Disruptive technology has occurred in higher education. Where there has been (1) competency-based education, students have different abilities. Technology assistance is used to make it easier for students to choose courses that suit their abilities. (2) The internet of things (IoT), increasing the connectivity of all existing equipment will make communication between students and lecturers, college tutors. (3) Virtual / augmented reality, virtual reality can make as if students actually carry out lab work (especially harmful or complex labs). (4) Artificial intelligence, online learning platforms with assistance, among others, can adapt to the needs of students.

For now, the quality standard of higher education is measured by the accreditation standard of BAN-PT which follows the assessment with 7 (seven) standards with the latest data as follows.

Figure 2. Accreditation of Institutions and Study Programs 2015-2017 (BAN -PT)



Source : Forlap Dikti, 2017 : http://banpt.or.id/

Looking at the data above, in reality there is still accreditation of universities (institutions) C, making higher education in Indonesia must really have a hard effort to be able to keep abreast of developments and changes that have occurred, if not to be eroded. Where the assessment between one standard point and the other standard points is interrelated (systemic). The thing that needs to be underlined is that the readiness of

universities to prepare a comprehensive education system must be carried out sustainably, not only accidentally, so that the overall quality assurance of teaching can be properly implemented.

Whereas judging from the total number of universities, the number of lecturers, the number of study programs throughout Indonesia in the last period of 2018 is as follows

Figure 3. Universities in Indonesia as of May 2018

Perguruan Tinggi di Indonesia per Mei 2018

	Higher education institution			Lecturers			Study programs			Students		
	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total
HEIs	123	3,130	3,253	73,090	171,583	244,673	6,947	14,150	21,097	2,554,382	4,710,729	7,265,111
HEIs with religious affiliation	109	1,062	1,171	15,171	14,049	29,220	2,443	2,965	5,408	454,931	495,149	950.080
HEIs under other ministries	183	0	183	9,683	0	9,683	731		731	173,572		173,572
Total	415	4,192	4,607	97,944	185,632	283,576	10,121	17,115	27,236	3,182,885	5,205,878	8,388,763

From the data above, it can be seen that until 2018, the number of tertiary institutions continued to rise from the previous year. This will make higher education in Indonesia only exist without being followed by quality management, so that the addition of higher education institutions in Indonesia will also be followed by a large number of qualified intellectual staff in accordance with the changes and development of the times

2. Policy on Management of Study Programs in The Era of Industrial Revolution 4.0

The Study Program is the spearhead of a university to shape the character of graduates. Therefore a management policy is needed that must be strongly supported by the parent institution (in this case the university). Adjustment to changes that occur is no longer a desire but a need that can no longer be rejected. The study program as the spearhead of education management in the implementative domain and in direct contact with graduates must have a policy that is accommodating in responding to the changes that occur.

Doing something "as a matter of policy" is doing it as a general rule. That is the difference between "policy" and "implementation" (Wilson, 1887) in (Baehaqie, 2015: 22), between "enacting" and "implementing" policies (Locke, 1690, chapter 12) in (Baehaqie, 2015: 22). Two main components determine the success of smart policies in practice: feasibility and desirability (March and Olsen 1983; Pollitt and Bouckaert 2004, 26) in (Baihaqie, 2015: 568).

To make policy by making it strong, policymakers not only issue decisions. They need to persuade people who must follow their decisions if the decision is to make general practice. In part, this involves the persuasion of the wider community: "Bully pulpit" Teddy Roosevelt is one of the important strategies. Some of the required persuasion is for subordinates who must implement and implement policies that are handed over to them by superiors (Baihaqie, 2015: 6). In this case the study program must be able to make a study program management policy which can later be implemented by all internal stakeholders.

National standards, the study program management policy refers to the standard 2 (two), namely governance, leadership, management systems, and quality assurance. All of these elements are integrated with each other. The procedures of the study program must be able to reflect good universal governance and be able to accommodate all the values, norms, structures, functions and aspirations of internal and external stakeholders of the study program, because stakeholders will provide input for effective and efficient management, so that the implementation of functions planning, organizing, staff development, direction, and supervision can be carried out properly. The importance of the existence of quality assurance in the study program will be very central to quality control of study programs carried out continuously quality improvement in all ranks of quality management systems in the framework of customer satisfaction.

The important thing that cannot be underestimated is the role of a leader. A leader must be able to predict the future, formulate and articulate the vision of the study program in a ralistic and measurable manner. For that a leader must obtain trust from subordinates (implementing policies), so that later a leader can be created who effectively directs and influences the behavior of all elements in the study program to follow mutually agreed values, norms, ethics, and organizational culture. Integrity of a leader in taking and deciding policies. Consistency in actions, values, and having strong principles in carrying out leadership greatly influences a leader to get trust from subordinates. A leader who has integrity is having a strong character and an honest person. The attitude of maintaining principles, not corruption has a high moral value, so that it has the competence and ability that exudes authority and honesty.

The era of industrial revolution 4.0 requires a study program management policy that prioritizes technology. Management of study programs must be supported by good monitoring and evaluation. And this can be realized with good support with good infrastructure, human resources and infrastructure. The policy adopted includes all the components in the study program, 2 (two) matters which are important topics, in this case lecturers and curriculum.

a. Lecturer Readiness

Lecturers as components of the academic community play an important role in transforming, developing, disseminating knowledge, technology and art. Where implementatively summarized in the tri dharma of higher education. The quality of higher education cannot be separated from the quality of the lecturer as an educator. Changes entered the industrial revolution era 4.0, so the demand for lecturers as a professional duty as an educator must have adaptive, communicative, flexible, creative and innovative characters with leadership, HOT, big data / IT literacy and English competencies and infact, currently lecturers in Indonesia according to Dikti's data in 2018 still face major problems, which are : (1) there are still many lecturers who do not meet the minimum educational qualifications (there are still S1); (2) The number of lecturers with doctoral degrees (S3) is still lacking; (3) there are still many lecturers who do not have academic positions; (4) the number of professors is still very small; (5) scientific publications of lecturers / scientists are still very low. For this reason, the study program must be able to facilitate lecturers to improve quality with several lecturer quality improvement programs. Some program activities that can be followed by lecturers in this case such as: (1) increasing the education strata by participating in a scholarship program; (2) encourage further study of lecturers to the doctoral level (S3) with scholarships, both from within and outside the country; (3) forming a lecturer academic position; (4) improvement of lecturer certification: (5) Include shorter training both at home and abroad; (6) lecturer internship; (7) lecturer exchanges; (8) lecturer database.

Some things are developing that in the era of industrial revolution 4.0 there is a shift in the role of educators which is divided into 3 (three) major sections (Wardani, 2018), namely.

1. Educators carry out learning and teaching functions. Demands that cannot be transferred are educators who must be able to utilize technology in increasing the ICT skills of students. In this case the direction of the use of ICT by educators are :

a. Provide greater flexibility and choice of learning materials and improve teaching techniques.
b. Deliver information and concepts more clearly through learning and quality learning resources.
c. Creating interesting learning and increasing the involvement of students in the learning process.
d. Provide adaptive solutions for students with special / specific needs.
e. Creating a learning environment where students feel safe and comfortable.
f. Develop learning in collaboration with parents, family, and society.

2. Educators as administrative planners and implementers. Educators (lecturers) must be able to utilize technology in administrative processes, making it possible to have free time for self-development. In this case the direction of the use of ICT by educators are :

a. Make extensive teaching and learning planning and balanced curriculum development.
b. Reuse, make changes and share documents.
c. Store and analyze student data for formative assessment and summative assessment.
d. Identify and manage professional self development including IT training needs.
e. Respond well to the emergence of technology and its implementation in the family and community environment.

3. Educators as executors of assessment and reporting. Educators (lecturers) must have a technology-based assessment and reporting system that facilitates the identification, identification and fulfillment of learning needs of students. In this case the direction of ICT utilization by educators are :

a. Support in making professional decisions.
b. Following the development of students.
c. Monitor students and ensure that the use of technology by students is safe, legal and responsible.
d. Communicate with parents/ guardians. Sharing information through online reporting.

From some of the things mentioned above, an educator in facing the changing industrial revolution era 4.0 must be literate in information technology, information literacy is not limited to mathematical calculations and readability of books, but also expertise in operating and utilizing technology in the implementation of the process learning. Strengthening the learning process will be strengthened by the curriculum applied to the study program. Therefore the curriculum must be able to accommodate market changes for the use of graduates produced by the study program.

b. Curriculum Readiness

The curriculum in a study program can be likened to a map of where the graduates of the study program will be. Facing changes in the revolutionary era 4.0, the curriculum of the study program must be able to make adjustments that integrate into the curriculum without adding courses or study burdens. Reorientation of the curriculum is carried out, because there are new literacy demands carried out comprehensively covering all elements, namely data literacy, technology literacy, and human literacy. The scope of activities carried out is extracurricular activities for leadership development and able to work in teams (teamwork) as well as entrepreneurship and internship. Where in the industrial revolution era 4.0 requires several skills competencies which are divided into 3 (three) major pillars, namely:

1. Learning and innovation Skill
- Critical thinking and problem solving
- Crearivity and innovation
- Communication and collaboration
2. Information, media and technology skills
- Information literacy
- Media literacy
- ICT Literacy
3. Life and Career skills
- Flexibility and adaptability
- Initiative and self directing
- Social and cross-cultural skills
- Productivity and accountability
- Leadership and responibility

This means that the applied curriculum must be able to stimulate educators to always do teaching, research and discovery of new innovations. Innovation is the key word for graduates able to survive and compete both in terms of science and skills so graduates have added value in competition in the world of work. So how is the gap between what is needed by the users of graduates (users) and the weaknesses of graduates who have still been there ? there is a mismatch between market needs and graduates (Wahidin, 2018). From market needs, the expected standards are (1) people skills; (2) problem solving skills; (3) communication skills (oral and writing); (4) leadership; (5) teamwork). While the weakness of college graduates is (1) critical thinking; (2) attention to detail; (3) communication skills; (4) ownership; (5) teamwork. So how is the study program curriculum compiled so that it is able to meet market expectations? then the things that must be done in the preparation of the curriculum must pay attention to 4 (four) elements contained in the curriculum (Winardi, 2018), which are :

1. Science, including: science and technology mastery and ontology, epistemology and axiology.
2. Characters, including: mental revolution (unlearn, relearn, to learn), religious, nationalist, integrity, independent, mutual cooperation.
3. Indonesianness, including: 4 pillars (Pancasila, Bhineka Tunggal Ika, NKRI, and UUD 45), defending the country, anti-radicalism, anti-drugs, and others. Globalization, including: aware of globalization and national competitiveness (creativity and innovation).
4. With the four elements contained in the curriculum of the study program, it is expected that graduates will have religious, nationalist, independent, mutual cooperation and integrity.

III. CONCLUSION

The era of industrial revolution 4.0 demands very serious readiness by universities in Indonesia, this is because this change cannot be avoided if university graduates in Indonesia want to compete openly with the international community. The role of tertiary institutions as institutions that produce intellectual power cannot be limited by rigid universities in the administration and management of teaching, meaning that now universities must be able to equip themselves with technology where the era of industrial revolution 4.0 is highly correlated with technology. Learning was originally compartmentalized in space, so facing the era of industrial revolution 4.0 carried out by distance learning (online learning). Colleges must be able to facilitate skills to students by providing leadership skills and being able to work in teams (teamwork) so that later graduates will be able to produce new innovations and be able to survive amid global competition.

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