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Research Paper

Challenges of Outcome-Based Vocational Education in the Industrial Revolution 4.0 and Society 5.0: Shifting Competency-Based Job Demands to Capability

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Abstract- *Changes in the structure of the economy are one of the consequences arising from the technological revolution 4.0. The oil and gas sector, which used to be the leading driver, is starting to be abandoned along with the development of electric and hybrid-based automotive technology. mining countries are indirectly forced to change their main source of income. Middle Eastern countries, for example, have begun to take quick steps by diverting foreign exchange sources to the financial and tourism sectors. Another impact that raises concerns is when there is an information economy mechanism that affects global politics. The face of the world has changed due to disinformation created by the many loop holes to engineer information through cyber algorithms to the phenomenon of Trump's victory in the United States. Technology always encourages the birth of 2 choices that are like two sides of a coin. When humans are worried about the emergence of humanoid robots due to the 4.0 industrial revolution, the concept of society 5.0 comes as a solution. The concept of society 5.0 was developed in Japan. Society 5.0 is a social concept that focuses on human-centered and technology-based care. The purpose of the concept is to create a society that truly enjoys a comfortable life.*

Keyword: ***Vocational, Education, Revolution 4.0, Competency, Capability***

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I. INTRODUCE

The industrial revolution 4.0 and Society 5.0 are one of the real shifts in work demands that are being and will be faced by SMKs. The industrial revolution 4.0 and Society 5.0 have almost the same description, namely an era that allows all production activities to take place fast, automated and cloud-based. The difference lies in the human position. Society 5.0 is the future society that Japan aspires to by emphasizing an active, respectful, fun and comfortable life based on advanced technology. The challenges for SMK are more severe because the Government has launched the "Making Indonesia 4.0 program. where one of the priority steps is improving the quality of human resources. Vocational High Schools as one of the leading producers of human resources in Indonesia must be able to predict environmental changes due to the program to determine appropriate management steps.

SMK is currently developing a new governance model, namely Good School Governance (GSG). This governance model is a development of the School-Based Management and Total Quality Management models which are more intensive in paying attention to the potential of the school. So far, the governance that has been developed only represents the capability of the school towards the school, the current governance is expected to bring the capability of the school to face various kinds of environmental turbulence in the 21st Century.

The model for strengthening the capabilities of SMK based on GSG has special advantages in managing the turbulence of the 21st Century environment. Turbulence tends to come with surprises, is dynamic, destroys and disrupts the existing system. The implementation of the eight points in the GSG are transparency, accountability, responsibility, independence, fairness, participation, effective efficiency, and consensus-based. These eight points are attached to the 8 National Education Standards (SNP) which include: management standards, financing standards, facilities and infrastructure standards, educators and education personnel standards, content standards, process standards, assessment standards, and graduate competency standards. The shift in work demands from competency-based to capabilities inherent in each SNP can be anticipated with GSG-based management.

Problem

Vocational High Schools (SMK) in Indonesia experience dynamic and adaptive changes over time. Various methods of renewal were experimented with SMK as an effort to improve the quality of continuing education. The push towards future-oriented Vocational Schools is the spirit of the Directorate of Vocational High Schools but has become a new burden for the micro level, namely SMK. From curriculum changes, upgrading of facilities and infrastructure, digitization, link and match, human resource needs, and other complex problems, vocational schools experience external (environmental) turbulence with various challenges and threats. This study is very appropriate to reveal the extent of the readiness of Vocational Schools in the face of 21st Century environmental turbulence.

In addition, the study offers several alternative methods of resolving turbulence that are packaged in Good School Governance as a linearization of the SMK development roadmap, namely governance. The results of the study concluded that more than 50% of SMKs in Indonesia at the provincial level, school status, and accreditation status stated that they were not ready to face environmental turbulence. The turbulence that tends to be unpredictable, dynamic, and chaotic causes the internal management of schools to have an effect on the inconduciveness of management which has an impact on the quality of education services. Strategy Strength, Weakness, Opportunity, Thread (SWOT), Ansoff Model Analysis, Strategic Architecture, Fishbone Diagram, School Turbulence Mitigation

System, and Good School Governance (GSG) can be an antidote to turbulence and bring SMK forward with high international competitiveness. GSG updated the management system in SMK by anticipating the implementation of the 8 National Education Standards (SNP) on policy turbulence, technology, labor market, and competitiveness. External challenges and opportunities need to be addressed positively for continuous improvement of SNP applications. Vocational schools need to create School Culture 4.0, Good-School Governance Management Information System (SIM-GSG), Internal Quality Assurance System, Industrial school board in governance standards. Vocational schools need to increase service management autonomy through the Regional Public Service Agency, prepare school financing information systems, create a Financial System Stability Index between Vocational High Schools and upgrade conventional tools/machines through technology independence 4.0. In terms of improving education services, vocational schools need to make Smart Management of Infrastructure Technology, update school facilities that are safe, comfortable, modern, digitalized, ergonomic, OHS-oriented, fun, interconnected, smart and accessible by users, and create a Good School Facilities Condition Index. From an HR perspective, vocational schools need to prepare a HR zeroization program with an undergraduate education level accompanied by a certificate of competency expertise, Smart Human Resources 4.0 skills, trustworthy with big data-based education services, and Recognition Prior Learning. At the learning level, Vocational High Schools have begun to disseminate the use of vocational 4.0 learning tools, redesign Industry 4.0 Curriculum, teaching factory with One-School One-Property Rights system, create technical instructions for Indonesian Students Skills Index. In addition, it is necessary to apply Smart Classroom Learning based on Science, Technology, Reading, Arts, Engineering, Mathematics (STREAM), update the Student Entrepreneurial Index and Entrepreneurial School Awards programs. The novelty of all these aspects will ultimately lead to how schools are ready to produce graduates by preparing for whatever happens in the future that is difficult to predict. This study has great significance for SMK in formulating future-oriented policies and opening up the broadest horizons with the international community. By opening the minds of school leaders, it is hoped that Vocational High Schools will be able to face turbulence, which is estimated to be the greater the shock, the faster the changes, and the faster the disruption for schools that are not ready to compete.

II. DISCUSSION

The industrial revolution 4.0 and Society 5.0 are real turbulence that are being and will be faced by SMKs. The industrial revolution 4.0 and Society 5.0 have almost the same description, namely an era that allows all production activities to take place fast, automated and cloud-based. The difference lies in the human position. Society 5.0 is the future society that Japan aspires to by emphasizing an active, respectful, fun and comfortable life based on advanced technology. The challenges for SMK are more severe because the Government has launched the "Making Indonesia 4.0 program. where one of the priority steps is improving the quality of human resources. Vocational High Schools as one of the leading producers of human resources in Indonesia must be able to predict environmental changes due to the program to determine appropriate management steps.

The Industrial Revolution 4.0 starts from the development of the 1.0, 2.0, and 3.0 industrial revolutions where this industrial phase is a real change from existing changes. Industry 1.0 is characterized by production mechanization processes to support the effectiveness and efficiency of human activities, industry 2.0 is characterized by mass production and quality standardization, industry 3.0 is characterized by mass

adjustment and flexibility of manufacturing based on automation and robots, and industry 4.0 is characterized by cyber-physical based on internet of things. (Hermann et al (2015) and Irianto (2017)).

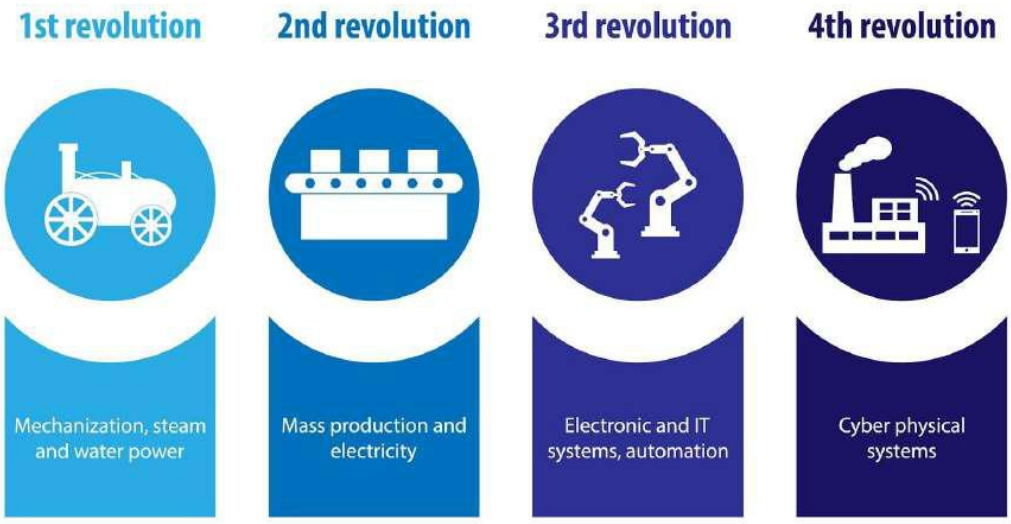

Image 1. The Development of the Industrial Revolution
(Source: https://www.yonomaulana.com/2018/08/tantangan-parapengajar-di-era-revolution.html)

Lee et al (2013) explained that the increasing digitization of industrial 4.0 manufacturing was driven by four factors, including: 1) an increase in data volume, computing power, and connectivity; 2) emergence of business analysis, ability and intelligence; 3) the occurrence of new forms of interaction between humans and machines; and 4) improvement of digital transfer instructions to the physical world. Meanwhile Lifter and Tschiener (2013) explain that the combination of machines, workflows, and systems that implement intelligent networks along the chain and production processes to control each other independently is a basic principle of industry 4.0.

Image 2. Technology in the Industrial Revolution 4.0
(Source: https://nusantaratv.com/industri/produsen-elektronik-di-batamjadi-pilot-industri-40-level-dunia)

The four design principles of industry 4.0 according to Hermann et al (2016) include: 1) interconnection between machines, devices, sensors, and people to connect and communicate with each other through the Internet of Things (IoT) or Internet of People (IoP); 2) transparency of information in the form of the ability of information systems to create virtual copies of the physical world by enriching digital models with sensor data, including data analysis and information provision; 3) the ability of the assistance system to support

people by combining and evaluating information to make the right decisions and find solutions to urgent problems in a short time, the ability of the system to support people by performing various tasks that are unpleasant, too tiring, or unsafe; (c) includes visual and physical assistance; and 4) decentralized decisions which is the ability of virtual physical systems to carry out tasks effectively and be able to make their own decisions wisely. Industry 4.0 is expected to be an approach to control the production process by synchronizing time and adjusting production (Kohler & Weisz, 2016). Industry 4.0 can be mapped as follows (Baur and Wee, 2015):

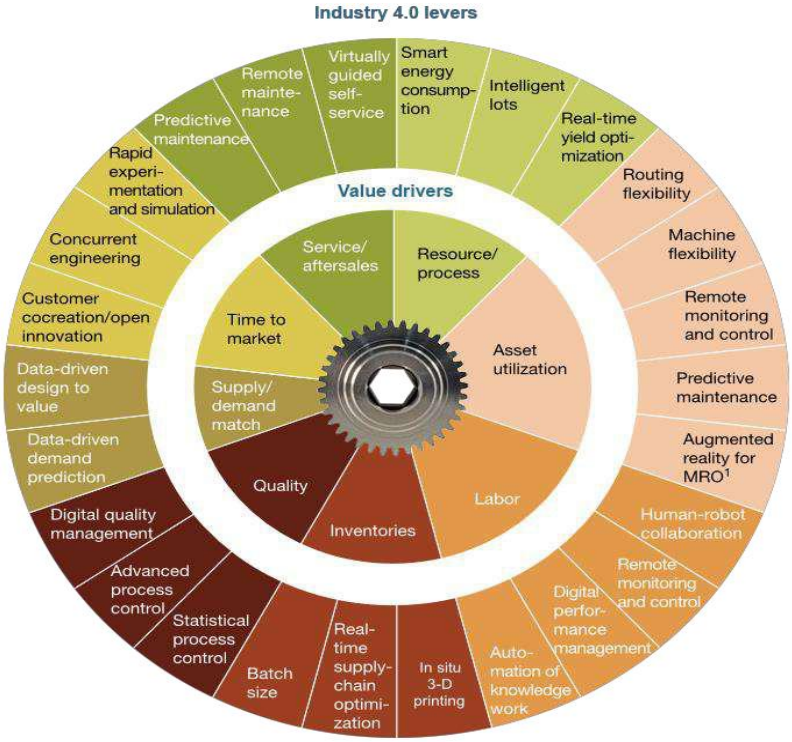

Image 3. Industry Characteristic Map 4.0
(Source: https://www.hestanto.web.id/revolution-industri/)

The picture above shows several components that are used as an instrument for implementing industry 4.0. The most basic things that must be met by the labor component include: 1) human collaboration with robots; 2) remote control and control; 3) digital performance management; and 4) automation of work knowledge. Industry 4.0 is the era of the digital revolution and the era of technological disruption. This era is called the era of the digital revolution because of the proliferation of computers and the automation of records in all digital-based fields. This era is also called the era of technological disruption because automation and connectivity in a field will cause the movement of the industrial world and work competition to be non-linear.

The application of artificial intelligence is one of the unique characteristics of industry 4.0 (Tjandrawinata, 2016). The use of robots will replace human labor so that the production process becomes more effective, efficient and inexpensive. Of course this is a challenge in itself in the field of human resource development (HR) today. Irianto (2017) also describes several challenges of industry 4.0 including; (1) readiness in industry; (2) reliable workforce; (3) convenience in socio-cultural arrangements; and (4) diversification and job creation. Apart from the challenges of industry 4.0, there are several industry 4.0 opportunities including; (1) innovation in the ecosystem; (2) competitive industry; (3) investment in technology; and (4) integration between small and medium enterprises (SMEs) and entrepreneurship. Challenges in vocational education are increasingly complex with the industrial era 4.0, where vocational education needs to prepare itself to answer the challenges of industry 4.0. Bukit (2014) explains that vocational education must have the following characteristics, including; 1) oriented to individual performance in the world of work; 2) specific justification for real needs in the field; 3) curriculum focus on psychomotor, affective, and cognitive aspects; 4) the measure of success is not only limited to schools; 5) sensitivity to developments in the world of work; 6) require adequate facilities and infrastructure; and 7) there is support from the community.

Changes in the structure of the economy are one of the consequences arising from the technological revolution 4.0. The oil and gas sector, which used to be the leading driver, is starting to be abandoned along with the development of electric and hybrid-based automotive technology. mining countries are indirectly forced to change their main source of income. Middle Eastern countries, for example, have begun to take quick

steps by diverting foreign exchange sources to the financial and tourism sectors. Another impact that raises concerns is when there is an information economy mechanism that affects global politics. The face of the world has changed due to disinformation created by the many loop holes to engineer information through cyber algorithms to the phenomenon of Trump's victory in the United States.

Technology always encourages the birth of 2 choices that are like two sides of a coin. When humans are worried about the emergence of humanoid robots due to the 4.0 industrial revolution, the concept of society 5.0 comes as a solution. The concept of society 5.0 was developed in Japan. Society 5.0 is a social concept that focuses on human-centered and technology-based care. The purpose of the concept is to create a society that truly enjoys a comfortable life.

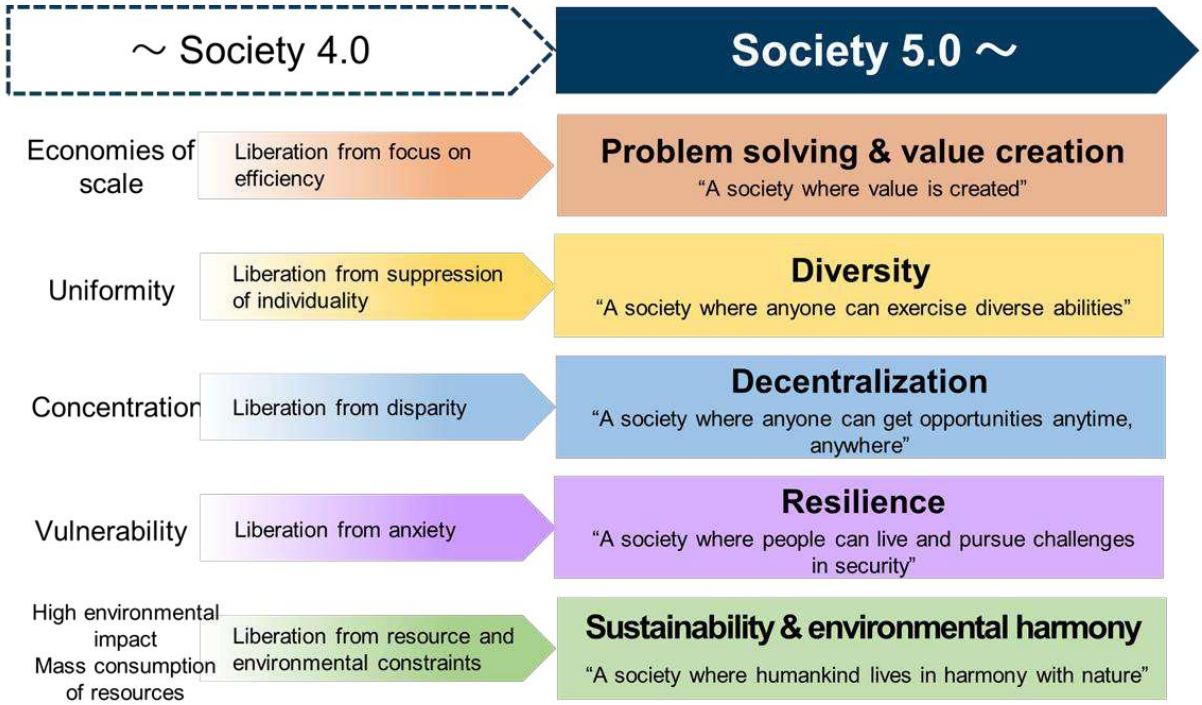

Image 4. Progress from Society 4.0 to 5.0
(Source: https://www.weforum.org/agenda/2019/01/modern-society-hasreached-its-limits-society-5-0-will-liberate-us/)

The concept of society 5.0 was born as an effort to counteract some of the negative things from the 4.0 industrial revolution which according to the assessment will have the potential to degrade human roles. The public was experiencing anxiety before the 5.0 concept was launched, due to the existence of super-sophisticated technology in the form of artificial intelligence. People's concerns about jobs that will be reduced can be reduced a little.

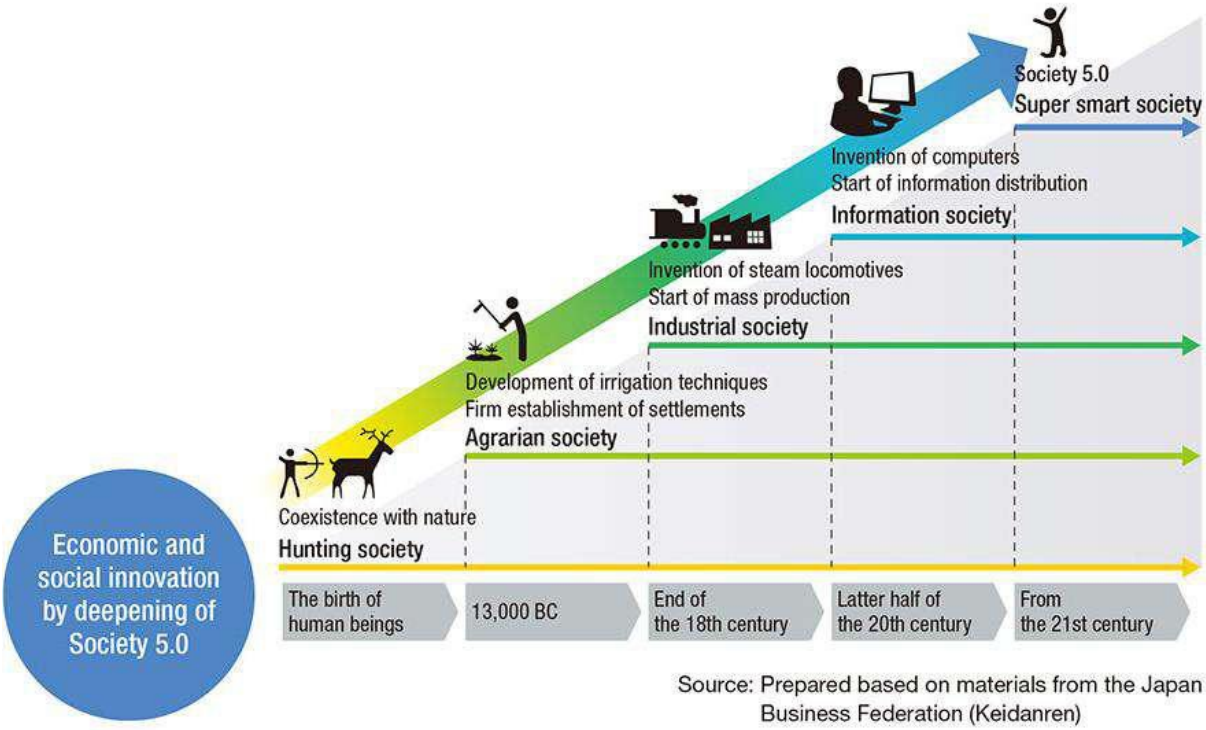

Image 5. Progress towards Society 5.0

SMK as an educational institution that has just undergone a policy change regarding the implementation of learning 4.0 is experiencing a new leap by being ready to face the era of society 5.0. This era that tends to be close to humanist values needs to be caught by schools because the role of humans cannot be completely replaced by machines and robots. For this reason, SMK prepares a blue-print to produce graduates who are prepared to produce graduates who are absorbed in companies characterized by society 5.0.

III. CONCLUSION

The conclusions about the challenges of PVBO in the era of the industrial revolution 4.0 and society 5.0 focus on Shifting the demands of competency-based work into capabilities are:

1. Vocational High Schools must be more prepared with their capabilities to survive adaptively and struggle to penetrate environmental turbulences that occur anywhere and anytime. Vocational High Schools have formidable challenges when it comes to meeting current and future workforce needs. The profile of the industrial workforce that is difficult to predict causes the direction and vision of the school to be upgraded according to the times.
2. Through the integrated GSG (Good School Governance) management system, it is hoped that it will further strengthen the capabilities of SMK in facing various kinds of changes in the future which are dynamic, uncertain, and difficult to predict.
3. Vocational High Schools can adjust the profile of SMK management capabilities to the demands of environmental changes. Armed with an understanding of the turbulence of environmental changes at a certain level, it can be seen the response that must be given by the SMK so that the future SMK strategy can adjust the level according to the turbulence of environmental changes (the match up process).
4. Policies are the basis for school quality to strengthen school capabilities towards quality superior schools. Wealth management owned by schools can provide positive power to deal with turbulence, both repetitive and chaotic.

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REFERENCES

[1]. Baur, C. & Wee, D. 2015. Manufacturing's Next Act? McKinsey & Company.
[2]. Hermann, M., et. all. 2016. Design Principles for Industrie 4.0 Scenarios. Presented at the 49th Hawaiian International Conference on Systems Science.
[3]. Irianto, D. 2017. Industry 4.0: The Chalenges of Tomorrow. Seminar Nasional Teknik Industri 2017. Batu Malang. Doi k8bksti.ub.ac.id/wp-content/uploads/2017/10/Keynote-Speaker-Dradjad Irianto.pdf
[4]. Kohler, D, & Weisz, J. D. 2016. Industry 4.0: The Challenges of the Transforming Manufacturing. Germany: BPIFrance.
[5]. Lee, J., Lapira, E., Bagheri, B., Kao, H., (2013). Recent Advances and Trends in Predictive Manufacturing Systems in Big Data Environment. Manuf. Lett. 1(1), 38–41.
[6]. Tjandrawina, R.R. 2016. Industri 4.0: Revolusi industri abad ini dan pengaruhnya pada bidang kesehatan dan bioteknologi. Jurnal Medicinus, Vol 29, No 1, Edisi April.