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The Influence of Technology Training in Increasing Productivity and Marketing Management Innovation in Society 5.0

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Abstract ;The purpose of this study is to present findings The Influence of Technology Training in Increasing Productivity and Marketing Management Innovation in Society 5.0. Currently, technological developments continue to develop non-stop and everyone must know technology to support their work. We know that with technology, people can quickly access various things to work, learn and create. Especially in the field of education, with this technology, students are required to follow and even master it. The impact is felt that work will be completed more quickly, but there are also problems caused by technology, such as the ease of information obtained, making people tend to be lazy in understanding each work context. And also not all people, especially in regional areas, are able to use technology to support work. It is very important to provide training in the use of technology for all levels of society to be able to compete at the global and international level.

Keywords: Technology Training, Productivity, Society 5.0

INTRODUCTION

The industrial revolution can be seen as a change in the way humans live and fundamental work processes. In the era of Industry 4.0, it was created advances in information technology that integrate the two worlds; world of life with the digital world which of course has an impact on various scientific disciplines. Presence The Industrial Revolution 4.0 creates a new face in the phase of technological progress nation. In the Industrial Revolution 4.0, manufacturing technology has entered a trending phase automation and data exchange. That includes cyber-physical systems, the internet of things (IoT), cloud computing, and cognitive computing. The birth of digital technology Accompanying the Industrial Revolution 4.0 has an impact on the order of human life in the whole world.
Things that hinder the progress of the Industrial Revolution 4.0 include:

are lack of adequate workforce skills, technology security issues

communication, stability, reliability of production machines, inability to change stakeholders, as well as the many job losses as things change
become automatic. On the other hand, technology also has a positive impact, namely dependency how individuals minimize risks and exploit opportunities

emerged in the transformation of the Industrial Revolution 4.0. This can happen in very different ways with what humans have experienced before.
Seeing the rapid movement of hot larvae of the Industrial Revolution 4.0, the State

Japan says the world will now enter the era of Society 5.0 or

Society 5.0. Conceptually, it is a human-centered social order

(human-centered) from the resulting technological sophistication. Industrial revolution 4.0 with one of the products being sophisticated information technology, which is considered to have potential in degrading the role of humans. This is what made Japan come up with a concept namely Society 5.0. One of the basic ideas of this concept, expected product Artificial intelligence will transform big data from internet transaction products on all areas of life become a new wisdom. Namely, creating hope to improve human capabilities in opening up new opportunities for humanity.
The impact of the Industrial Revolution 4.0 and Society 5.0 opens up new opportunities for Indonesia. Indonesia with the concept of Making Indonesia 4.0 is committed to building a globally competitive manufacturing industry. Through industrial acceleration
4.0, the launch of Making Indonesia 4.0 is seen as a road map and strategy Indonesia is currently entering the digital era. Making Indonesia 4.0 is expected can provide a clear direction for the movement of national industry in the future, including a focus on developing five manufacturing sectors that will become pilot. In preparing this road map, various stakeholders were involved interests, starting from Government Institutions, business actors, industry associations, providers technology, as well as research and educational institutions. Through commitment and active participation from all these parties, it can be believed that the implementation of industry 4.0 in Indonesia will running successfully and on target.
This article is produced from narrating previous ideas, both from the results

research studies, raising awareness about Industrial Revolution 4.0, Society 5.0, and Making Indonesia 4.0. In its description, this article is outlined with the aim of: provides an overview of the emergence of the idea of Society 5.0 and Indonesia's readiness to play a role in it in depth in the dimensions of research studies. Therefore, the series of writing begins with introduction, industry 4.0, Society 5.0, industry 4.0 research trends, and ending with a research map Indonesia in Society 5.0.

Industry 4.0

The term Industry 4.0 was officially born in Germany at the Hannover event
Fair in 2011 (Kagermann et al, 2011). The German state has an interest

There is a big problem in this regard because Industry 4.0 is part of the policy plan its development is called High-Tech Strategy 2020. This policy aims to keep Germany at the forefront of the world manufacturing (Heng, 2014). Several other countries also participated in making it happen industry 4.0 concept but uses different terms such as Smart Factories,
Industrial Internet of Things, Smart Industry, or Advanced Manufacturing. Although have different terms, they all have the same purpose, namely to increase the competitiveness of each country's industry in facing the global market very dynamic. This condition is caused by the rapid development of utilization digital technology in various fields. Industry 4.0 is very often considered a revolution fourth industry because of the profound effects it has had and will bring a productive new paradigm with application in several fields of activity (Abreu, 2018; Morrar, Arman, & Mousa, 2017; Liu, Cao, Yang, & Jiang, 2018; Shamim et al., 2017; Liao et al., 2017; Fraga-Lama, Noceda-Davila, Fernández-Caramés, Díaz-Bouza, & Vilar-Montesinos, 2016; Ang et al., 2017; Pilloni, 2018). Industry 4.0 is predicted to have great potential benefits. Table 1 shows the potential benefits of Industry 4.0 according to several articles. Most of the opinions regarding the potential benefits of Industry 4.0 are about improvements speed, production flexibility, improved service to customers and improvements

income. The realization of these potential benefits will have a positive impact to a country's economy. Industry 4.0 does offer many benefits, but it also has challenges that must be faced. Drath and Horch (2014) argues that the challenges faced by a country when implementing
Industry 4.0 is the emergence of resistance to changes in demographics and social aspects, instability political conditions, limited resources, risks of natural disasters and implementation demands environmentally friendly technology. According to Jian Qin et al (2016), there is a gap which is quite wide in terms of technology between the current conditions of the industrial world and the current conditions
what is expected from Industry 4.0. Research conducted by Balasingham (2016) also shows that there is a factor of company reluctance to implement Industry 4.0 because they are worried about the benefits.
Based on these explanations, it is in accordance with what was conveyed by Zhou et al (2015), in general there are five major challenges that will be faced, namely aspects of knowledge, technology, economics, social and politics. To answer challenges
This requires a large, well-planned effort and a good strategy from the regulator

(Government), academics and practitioners. Kagermann et al (2013) conveyed the need for academic involvement in the form of research and development to realize Industry 4.0. According to Jian Qin et al (2016) road map Technological development to realize Industry 4.0 is still not focused. This matter This happens because Industry 4.0 is still an idea that is a real form of the whole the aspects are not yet clear so that it can give rise to various possible directions development.

Definition of Industry 4.0

Definitions regarding Industry 4.0 vary because they are still in the research stage development. German Chancellor Angela Merkel (2014) argued that Industry 4.0 is a comprehensive transformation of all aspects of production in industry through combining digital and internet technology with conventional industry. Schlechtendahl et al (2015) emphasize the definition of the speed element availability of information, namely an industrial environment in which all entities always connected and able to share information with each other. Meaning More technically, Kagermann et al (2013) stated that Industry 4.0 is integration from Cyber Physical Systems (CPS) and Internet of Things and Services (IoT and IoS) to in industrial processes including manufacturing and logistics and other processes. CPS is technology to combine the real world with the virtual world. Merger
This can be realized through integration between physical and computational processes (technolgy embedded computers and networks) in a closed loop (Lee, 2008). Hermann et al (2015) adding that Industry 4.0 is a term to refer to a group of technologies and value chain organizations in the form of smart factories, CPS, IoT and IoS. Smart factories are modular factory with CPS technology that monitors the physical production process later display it virtually and decentralize decision making.
Through IoT, CPS can communicate with each other and work together in real time including humans. IoS is all service applications can utilize by every stakeholder both internally and between organizations. There is
The six design principles of Industry 4.0 are interoperability, virtualization, decentralization, real time capabilities, service oriented and modular. Based on several
The explanation above, Industry 4.0 can be interpreted as an industrial era in which all entities those in it can communicate with each other in real time at any time with based on the use of internet and CPS technology to achieve its goals creation of new value or optimization of existing value from every process in the industry.

The concept of Industry 4.0 is generally accepted in view of scientific knowledge (Abreu, 2018), although there are some variations in the definition, because considering its social and political implications (Müller, Kiel, & Voigt, 2018). But

What does Industry 4.0 actually consist of? It can be considered that Industry 4.0 “consists of a comprehensive and systematic digital network of creation, logistics and use of the product or service" (Hennies & Raudjärv, 2015, p. 1). In summary

“Industry 4.0 includes horizontal integration of data flows between partners, suppliers and customers, as well as vertical integration within them organizational structure, which involves factors related to development final product and combines the real world with the virtual world. Results is a system in which all processes are fully integrated, thus building information platform updated in real time” (Abreu, 2018, p. 129).

Industry 4.0 includes horizontal integration of data flows between partners, suppliers and customers, equivalent to vertical integration in the organizational structure, which involves factors related to final product development and combining worlds real and virtual world. The result is a system where all processes are integrated full, thus building an information platform that is always updated in real time. Industry 4.0 is an integration between technology, virtual space and humans, between the real world and the virtual world and generate a true collaborative network (Hennies & Raudjärv, 2015; Rubio-Tamayo, Gertrudix Barrio, & García García, 2017) namely by integrating/synergizing: intelligent robots; automatic simulation; Internet about Things; cloud computing; additive manufacturing; and big data analytics (Ang et al.,
2017). Integration logic used to unite real and digital situations carried out through "smart factories" as integration centers (Lin et al., 2017 p.4).

“The smart factory is a core concept of Industry 4.0, which employs cyberphysical systems to monitor the physical production processes of the factory and make decentralized decision-making possible. Then the physical systems become the Internet of Things, communicating and cooperating both with each other and with humans in real-time via the wireless web.”

Thus the “smart factory” is the core concept of Industry 4.0 its operations use cyber-physical systems to monitor processes directly factory production and enables decentralized decision making.
Then this physical system is realized as the Internet of Things, which can communicate and collaborate with each other, with humans in real-time via wireless network.

Society 5.0

Society 5.0 follows Industry 4.0 to some extent, while Industry 4.0 focuses on production, Society 5.0 seeks to place
humans as the center of innovation. As well as utilizing the results and impacts of industrial technology
4.0, with deepening technology integration in order to improve quality life, social responsibility and sustainability (i-SCOOP, n/d, Serpanos, 2018).
Wang, Yuan, Yong, Wang, Xiao, and Qin (2018) and Wang, Li, Yuan, Ye, and Wang

(2016) shows that the concept of Society 5.0 emerged in 2015 in Japan

(Abreu, 2018), as a national political initiative strategy (Keidanren, 2016; Harayama, 2017; Research and Development Strategy Center: Japan Science and Technology Agency, 2017).
According to Hayashi et al. (2017), with Society 5.0, Japan is trying

[…] [to] create new values by collaborating and cooperating with several different systems, and plans standardization of data formats, models, systems architecture, etc. and development of necessary human resources. In addition, it is expected that enhancements of intellectual properties development, international standardization, IoT system construction technologies, big data analysis technologies, artificial intelligence technologies and so on encouraging Japan's competitiveness in “super smart society” (p. 264).
Namely creating new values by collaborating and working together several different systems, and planning standardization of data formats, models, systems system architecture, and development of necessary human resources. Besides that, expected increased development of intellectual property, international standardization, construction system IoT technology, big data analysis technology, artificial intelligence technology and so on that drive Japan's competitiveness in a "super-smart society" (p.
264).

Keidanren (Japan Business Federation) (2016) presents the goals of Society 5.0, as
Every individual including elderly people and women can live safely and guaranteed comfortable and healthy life and each and every individual can realize his/her desired lifestyle. […] Improvement of productivity through digitization and reform of business models are promoted, and at the same time time, the new economy and society will be realized by promoting innovation and globalization. […] Efforts are made to solve a pile http://mos.sciedupress.com Management and Organizational Studies Vol. 5, no. 4; 2018 Published by Sciedu Press 28 ISSN 2330-5495 E-ISSN 2330- 5509 of issues of our country such as falling population, super aging society and natural disasters so that a rich and vigorous future will be realized. Through overseas expansion of new businesses and services, we can contribute to solving global scale issues as well (p. 10).
Every individual including the elderly and women can live safely and comfortably and alive healthy and every individual can realize their desired lifestyle. [...] Increased productivity
through digitalization and reform of the promoted business models, and at the same time Likewise, a new economy and society will be realized by promoting innovation and globalization. [...] Efforts are being made to resolve the problems of our country which can be seen at http://mos.sciedupress.com Management and Organizational Studies Vol. 5, no. 4; 2018 Published by Sciedu Press 28 ISSN 2330-5495 E-ISSN 2330-
5509; namely, such as a declining population, a very old society, and disasters nature so that a rich and vibrant future will be realized. Through expansion new businesses and services overseas, we can also contribute to solving
global scale problem.

There are several challenges that must be faced, Serpanos (2018) namely when considering legacy IT systems; challenges include integration and software upgrades, inter-network operations, synchronization to solve real time processes and applications and more importantly the security factor. For Therefore, the following are very important things to realize: (1) Strategy formulation national and integration of government promotion systems; (2) Development of laws about the application of advanced techniques; (3) Establishment of a scientific foundation; (4)

Dynamic involvement of all citizens in the new economy and society; (5)

Integration of advanced technology and society (Keidanren (Japan Business Federation), 2016, p. 14)

Wang (2018, p. 6) states that the theory from the study of Society 5.0 is parallel intelligence, which is a new methodology for expanding theory traditional artificial intelligence into emerging cyber-physical-social systems (CPSS). More specifically, parallel intelligence is very effective in dealing with issue type problems

"human-in-the-loop" with social complexity and engineering complexity, and aims to find intelligent, focused and convergent solutions to uncertain problems, diverse and complex.

Therefore, Society 5.0 has the ultimate goal of improving

quality of life of society by mobilizing the productive and technological potential of Industry 4.0. Super smart societies are characterized as follows: societies in which various needs of society are differentiated and met by providing products and necessary services in required quantities to people who need it when they need it, and where everyone can receive high-quality services and live a comfortable and full life spirit that allows for their various differences such as age, gender, region, or language (Harayama, 2017, p. 10). As the final goal and to the limit certain things are unavoidable: "it promises to revolutionize society as we do know, and to improve the way we live and live in community, in our personal and professional lives" (Costa, 2018).

The anticipated continued advancement of IT will provide that opportunity extraordinary for individuals and society for innovation, growth, and prosperity through joint human-machine collaboration and co-creation. However, These same advances also present ethical, legal, social, security, unprecedented privacy and safety issues that need to be addressed, before the true benefits of the opportunity can be realized (Research Center and Development Strategy: Japanese Science and Technology) Agency, 2017,

p. 1). These potential social and educational implications are also reminded by Horikawa

(2017) namely the unprecedented high speed results of the technology innovation that sneaks into social life, as a mandatory citizen

However, this future can only progress with the emergence of new research to catalyze interdisciplinary social and hard sciences and engineering.

This convergence is necessary to form a partnership between humans and technology that is sustainable, vibrant and livable. Research, social and ethical implications the future discussed. (Medina-Borja, Center for Research and Development Strategy:

Japan Science and Technology Agency, 2017, p. 235).

Making Indonesia 4.0

Industrial Revolution 4.0 includes a variety of advanced technologies, such as intelligence artificial intelligence (AI), Internet of Things (IoT), wearables, advanced robotics, and 3D printing. Indonesia will focus on five main sectors for initial implementation of this technology, namely (i) food and beverages, (ii) textiles and clothing, (iii) automotive, (iv) chemicals, and (v) electronic. This sector was chosen to

be the focus after evaluating the economic impact and implementation feasibility criteria that include GDP size, trade, potential impact on other industries, size of investment, and speed of market penetration. Indonesia will evaluate the strategy of each sector focus every three to four years for reviewing progress and addressing implementation challenges.

Building a powerhouse F&B industry in ASEAN

In 2016, this sector contributed 29 percent of manufacturing GDP,

24 percent of manufacturing exports, and absorbs 33 percent of the manufacturing sector workforce. When compared with other countries, Indonesia's food and beverage sector has large growth potential because it is supported by agricultural resources abundant and large domestic demand. Strategy for food and drink 4.0 including: (1) Encouraging productivity in the upstream sector, namely agriculture, livestock, and fisheries, through the application and investment of advanced technologies such as systems automatic monitoring and autopilot drones. (2) Because more than 80% of the workforce in This industry works in MSMEs, including farmers and small-scale producers, Indonesia will help MSMEs along the value chain to adopt technologies that can increase their production output and market share. (3) Commit to invest in packaged food products to capture all demand domestic market in the future along with increasing consumer demand. (4) Increasing exports by utilizing access to agricultural resources and domestic economies of scale.

Towards the leading functional clothing manufacturer

In 2016, this sector contributed 7 percent of manufacturing GDP, 15

percent of manufacturing exports, and 20 percent of manufacturing employment. By

Historically, this sector is the second largest contributor to manufacturing exports in Indonesia.

Adoption of the Industrial Revolution 4.0 in this sector will make Indonesia capable maintain and increase its competitiveness in global market share. Textile strategy and clothing 4.0 including: (1) Increasing capabilities in the upstream sector, focus on production of chemical fibers and clothing materials at lower costs and quality to increase competitiveness in the global market. (2) Increase productivity manufacturing and labor through the application of technology, optimization of factory locations as well skill improvement. Furthermore, along with economic growth and shift in demand from basic clothing to functional clothing, like sportswear, Indonesia must be able to (3) build capabilities

production of functional clothing and (4) increasing economies of scale to meet

The demand for functional clothing continues to grow, both in the domestic and international markets export.

Become a leading player in ICE and EV exports

Supported by the domestic market and strong investment from various companies leading automotive industry, Indonesia wants to become the largest car producer in ASEAN. Indonesia is currently the second largest automotive exporter in this region, although vehicle production still depends on imports of raw materials (metals and chemistry) and other important electronic components. Apart from that, along with penetration world electric vehicles (EVs) which are expected to increase sharply in 2020, Indonesia will focus on supporting EV development. Automotive strategy 4.0

including: Increasing local production, in terms of (1) volume and (2) production efficiency raw materials and critical components through technology adoption and development The relationship between Society 5.0 and artificial intelligence

AI refers to programmed machines that exhibit features of the human mind such as learning and problem solving [16,54–56]. Here, the topics of the hunter-gatherer 188 CHAPTER 7 Society 5.0: Effective technology for a smart society period left their place for other subjects with the development of tools. Several reasons, such as catching game animals, not being developed enough to kill them in a single shot, inability to neutralize them, hardly neutralizing animals, and inability to explain various natural phenomena with the available technologies, are some of the main factors that shaped the technological developments in this period. Technological developments that made the invention of agriculture possible have played a role in changing human life in many areas. The world is moving with Society

5.0 toward a “radical change period” in which the process of creating knowledge and value under the domination of digital technologies changes daily, and social and industrial structures emerge under the rule of smart devices. In this context, AI technologies have begun to be integrated into human life at a time when the world has become a global village as a result of developments in information and communication technologies. In addition, AI technologies are integrated into human life, enabling the future society to transform in the axis of smart and digital devices [57].

The Society 5.0 revolution has reached predictable dimensions. It is causing and will continue to change and transform human life. Technological inventions and tools play an important role in change and transformation [9].

Society 5.0 is defined as an intelligent society that includes standardized processes to evaluate human demands and meet their needs using AI technology. Therefore, a digital knowledge-based society must work for environmental, economic, and social sustainability and efficiency. Human and social resources are at the center of developments in smart societies and smart cities, which require innovative methods and techniques for predictive and adaptive processes. Here, it is aimed to design a knowledge-based economy with a digital infrastructure that can work together and provide dynamic real-time interactions among various smart city subsystems. Society 5.0, on the other hand, is accumulating data in cyberspace with AI. New data is produced by AI, taking into account human-machine cooperation and interaction. Thus, it aims to balance economic progress and social problem solving by developing similar to biological evolution [42]. In summary, it is the aim of Society 5.0 to perfect the harmony of human needs and production processes and to continuously upgrade process data, products, and services with smart systems and related infrastructures [13].

In line with these purposes, technological sustainability, integration, and transparency have been determined as basic principles [18]. Society 5.0 will not only make the new information obtained from information societies available to humans, but it will also share this information with AI robots. AI-based technological assets and people will be able to obtain information outside of the economy/ work area, in every frame of social life, and will engage in mutual information sharing and cooperation. The scope and extent of the digitalization of information will extend to all areas, ranging from legal areas to social systems. In short, the digitalization and transformation process will progress continuously and rapidly in every field [58]. The obstacles to Society 5.0

Implementing Society 5.0 goals in real life cause a social transformation. However, some potential obstacles are encountered in the said transformation process. The obstacles to overcome in order to implement Society 5.0 are:

- socio-political obstacles
- obstacles in the legal system
- technological obstacles
- lack of qualified human resources
- social resistance

To overcome socio-political obstacles, it is recommended to implement national strategic moves with the support of industry and academia, provide state support, establish an IoT platform, and establish a think tank.
To overcome obstacles in the legal system, it is recommended to establish rules to direct data use and implementation, support regulations and system reform, and supervise the legislative process on copyright-intellectual property rights. To overcome technological obstacles, it is recommended to support technologies such as AI, cyber security, and autonomous robots, and to make some improvements related to innovation in science and technology.
To overcome the lack of qualified human resources, it is recommended to organize training for the dynamic participation of all citizens, support the provision of personnel for cyber security, data science, and international standardization, and encourage women's participation in order to reveal talents.
To overcome social resistance, it is recommended to create social consensus by distributing the national vision among all stakeholders and addressing ethical and social implications from human-machine relationships to philosophical issues In this study, we examined in detail the Japanese concept of Society 5.0 and its relationship with AI. First, we described all the industrial revolutions that led up to this period. Second, and were explained, then the birth, definition, goals, obstacles of the Society 5.0, the innovations it provides, and its relationship with artificial intelligence are examined. The "super-smart society" model put forward by the Japanese aims to enable everyone to live a satisfying and prosperous life by using both humans and AI. In addition, this model aims to create a more livable world by minimizing negative effects such as unemployment. It is a very important approach in terms of providing for the needs of all individuals in a timely fashion.

CONCLUSION

The main purpose of Society 5.0 is to produce solutions to combat the aging world population, to ensure that the virtual and real-world work together, to benefit from the IoT in a way that contributes to society, and to generate ideas for mitigating
190 CHAPTER 7 Society 5.0: Effective technology for a smart society environmental pollution and natural disasters. In addition, it was observed that with the transfer of business processes to the digital environment, AI and robot technology improved and the need for manual power decreased. In short, it can be said that digital development and transformation create new employment opportunities and eliminates many business areas. However, AI focuses on facilitating human life, ensuring efficiency in production, and surviving in a competitive environment.

DAFTAR PUSTAKA

Abreu, P. H. C. (2018). Perspectivas para a gestão do conhecimento no contexto da Indústria 4.0 [Perspectives for knowledge management in the context Industry 4.0]. South American Development Society Journal, 4(10), 126. https://doi.org/10.24325/issn.2446-5763.v4i10p126-145.

Ang, J., Goh, C., Saldivar, A., & Li, Y. (2017). Energy-efficient through-life smart design, manufacturing and operation of ships in an Industry 4.0 environment.

Energies, 10(5), 610. https://doi.org/10.3390/en10050610.

Balasingham, K. (2016). Industry 4.0: Securing the Future for German Manufacturing

Companies. Master's Thesis. University of Twente

Center for Research and Development Strategy, Japan Science and Technology Agency (2017). Future Services & Societal Systems in Society 5.0. Tokyo: Japan. Retrieved December 13, 2019 from https://www.jst.go.jp/crds/pdf/en/CRDS-FY2016-WR-13.pdf

Costa, José Manuel (2018). Sociedade 5.0: a mudança que aí vem. 13/04/2018. https://hrportugal.pt/sociedade-5-0-a-mudanca-que-ai-vem/

De Felice, F., Petrillo, A., & Zomparelli, F. (2016). Design and control of logistic process in an Italian Company: Opportunities and Challenges based on Industry 4.0 principles. Proceedings of the Summer School Francesco Turco.

Deloitte. (2015). Industry 4.0. Challenges and solutions for the digital transformation and use of exponential technologies. Deloitte, 1–30.

Drath, R., & Horch, A. (2014). Industrie 4.0: Hit or hype?[industry forum]. IEEE industrial electronics magazine, 8(2), pp. 56-58.

Fraga-Lamas, P., Noceda-Davila, D., Fernández-Caramés, T., Díaz-Bouza, M., & Vilar- Montesinos, M. (2016). Smart pipe system for a shipyard 4.0. Sensors, 16(12), 2186. https://doi.org/10.3390/s16122186.

Prosiding Seminar Nasional Penguatan Riset dan Luarannya sebagai Budaya Akademik di Perguruan Tinggi memasuki Era 5.0

Harayama, Yuko (2017). Society 5.0: Aiming for a New Human-centered Society. Collaborative Creation through Global R&D Open Innovation for Creating thE Future: Volume 66 Number 6 August 2017. Hitachi Review. Pp. 8-13. Hitachi Review Vol. 66, No. 6. http://www.hitachi.com/rev/archive/2017/r2017_06/pdf/p08-13_TRENDS.pdf

Hayashi, H., Sasajima, H., Takayanagi, Y., & Kanamaru, H. (2017). International standardization for smarter society in the field of measurement, control and automation. Proceedings of the 56th Annual Conference of the Society of Instrument and Control Engineers of Japan (SICE). Kanazawa, Japan: Institute of Electrical and Electronics Engineers (IEEE). https://doi.org/10.23919/sice.2017.8105723.

Heng, S. (2014). Industry 4.0: Upgrading of Germany's Industrial Capabilities on the Horizon. https://ssrn.com/abstract=2656608, Diakses pada 13 Desember 2019. Hennies, M., & Raudjärv, M. (2015). Industry 4.0. Introductory thoughts on the current situation. Estonian Discussions on Economic Policy, 23(2). https://doi.org/10.15157/ tpep.v23i2.12491.

Hermann, M., Pentek, T., & Otto, B. (2016). Design principles for industrie 4.0 scenarios.

System Sciences (HICSS), 49th Hawaii International Conference, pp. 3928-3937. i-SCOOP (n/d). From Industry 4.0 to Society 5.0: The big societal transformation plan of Japan. Retrieved December 13, 2019 from https://www.i-scoop.eu/industry-4-0- society-5-0/

Jian Qin, Ying Liu, Roger Grosvenor, A Categorical Framework ofManufacturing for Industry 4.0 and Beyond, Procedia CIRP 52,pp. 173-178, 2016.

Kagermann, H., Lukas, W.D., & Wahlster, W. (2013). Final report: Recommendations for implementing the strategic initiative INDUSTRIE 4.0. Industrie 4.0 Working Group.

Keidanren (Japan Business Federation) (2016). Toward realization of the new economy and society. Reform of the economy and society by the deepening of “Society 5.0”. Retrieved April 16, 2018 from

http://www.keidanren.or.jp/en/policy/2016/029_outline.pdf

Kovar, J., Mouralova, K., Ksica, F., Kroupa, J., Andrs, O., & Hadas, Z. (2016). Virtual reality in context of Industry 4.0 proposed projects at Brno University of Technology. Mechatronics-Mechatronika (ME), IEEE 17th International Conference, pp. 1-7.

Landherr, M., Schneider, U., & Bauernhansl, T. (2016). The Application Center Industrie 4.0-Industry-driven Manufacturing, Research and Development. Procedia CIRP, 57, pp. 26-31

Lasi, H., Fettke, P., Kemper, H.G., Feld, T. & Hoffmann, M. (2014). Industry 4.0.

Business & Information Systems Engineering, 6(4), p.239.

Lee, E.A. (2008,). Cyber physical systems: Design challenges. In Object Oriented Real- Time Distributed Computing (ISORC), 11th IEEE International Symposium, pp. 363-369.

Prosiding Seminar Nasional Penguatan Riset dan Luarannya sebagai Budaya Akademik di Perguruan Tinggi memasuki Era 5.0

Liao, Y., Deschamps, F., Loures, E. de F. R., & Ramos, L. F. P. (2017). Past, present and future of Industry 4.0 – A systematic literature review and research agenda proposal. International Journal of Production Research, 55(12), 3609–3629.

https://doi.org/10.1080/ 00207543.2017.1308576.

Liu, X., Cao, J., Yang, Y., & Jiang, S. (2018). CPS-based smart warehouse for Industry

4.0: A survey of the underlying technologies. Computers [Internet]. MDPI AG, 7(1), 13. http://dx.doi.org/10.3390/computers7010013.

Mazak, A., & Huemer, C. (2015). A standards framework for value networks in the context of Industry 4.0. In Industrial Engineering and Engineering Management (IEEM), 2015 IEEE International Conference, pp. 1342-1346.

Merkel, A. (2014). Speech by Federal Chancellor Angela Merkel to the OECD Conference. https://www.bundesregierung.de/Content/EN/Reden/2014/2014-02- 19-oecd-merkel-paris _en.html, Diakses pada 11 Desember 2019.

Moniz, A., & Krings, B.-J. (2016). Robots working with humans or humans working with robots? Searching for social dimensions in new human-robot interaction in industry.

Societies, 6(3), 23. https://doi.org/10.3390/soc6030023.

Morrar, R., Arman, H., & Mousa, S. (2017). The fourth industrial revolution (Industry

4.0): A social innovation perspective. Technology Innovation Management Review, 7(11), 12–20. https://doi.org/10.22215/timreview/1117.

Mouzakitis, A. (2017). Modernity and the idea of progress. Frontiers in Sociology, 2. https://doi.org/10.3389/fsoc.2017.00003. Müller, J. M., Kiel, D., & Voigt, K.-I. (2018). What drives the implementation of industry 4.0? The role of opportunities and challenges in the context of sustainability. Sustainability, 10(1), 247. https://doi.org/10.3390/su10010247.

Neugebauer, R., Hippmann, S., Leis, M., & Landherr, M. (2016). Industrie 4.0-From the Perspective of Applied Research. Procedia CIRP, Vol. 57, pp. 2-7.

Nigappa, K., & Selvakumar, J. (2016). Industry 4.0: A Cost and Energy efficient Micro

PLC for Smart Manufacturing. Indian Journal of Science and Technology, Vol. 9, Issue. 44. Qin, J., Liu, Y., & Grosvenor, R.

Palazzeschi, L., Bucci, O., & Di Fabio, A. (2018). Re-thinking innovation in organizations in the industry 4.0 scenario: New challenges in a primary prevention perspective. Frontiers in Psychology, 9. https://doi.org/10.3389/fpsyg.2018.00030. Pfeiffer, S. (2016). Robots, Industry 4.0 and humans, or why assembly work is more than routine work. Societies, 6(2), 16. https://doi.org/10.3390/soc6020016.

Pilloni, V. (2018). How data will transform industrial processes: Crowdsensing, crowdsourcing and big data as pillars of Industry 4.0. Future Internet, 10(3), 24. https://doi.org/10.3390/ fi10030024.

Prasetyo, H & Sutopo, W. (2018). INDUSTRI 4.0: TELAAH KLASIFIKASI ASPEK DAN ARAH PERKEMBANGAN RISET. Jurnal Teknik Industri, Vol. 13, No. 1.