DEVELOPMENT OF SCIENCE AND TECHNOLOGY TO REALIZE
THE INDUSTRIAL REVOLUTION 4.0 AND THE INTERNET OF THINGS (IOT) IN INDONESIA

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ABSTRACT

With reference to the above theme, can be expressed purpose of writing the following research: collecting data and information and to find out about the development concept of science and technology in realizing the industrial revolution 4.0 and the Internet of Things (IOT) in Indonesia.

The method used is qualitative research. Data collection techniques using literature study undertaken to collect, study the theories, rules, information obtained from the book and review documents in the form of journals, textbooks and papers relating to the research problem.

Main findings in research that is through the roadmap making Indonesia 4.0, set strategy for dealing with Industry 4.0 that encourage labor force in Indonesia continues to increase the ability and skills, especially in the use of technology IOT or integrate Internet capabilities with production lines in the industry massively, and utilization of teknlogi digital more optimal in the industry national as Big Data (machine learning), autonomous robots, cybersecurity, cloud, and relevant.

This research can be useful for all readers and all the disciplines and industries in order to increase knowledge and insight.The result is expected to be a thought or consideration of alternative materials for decision makers in solving similar problems regarding the industrial revolution 4.0 and IOT. Provide feedback to the relevant institutions in order to further optimize the development of science and technology in realizing the industrial revolution 4.0 and the Internet of Things (IOT) in Indonesia.

The rapid development of science and the use of digital technology over the Internet in various fields.With the development of science and technology so as to achieve 4.0 and IOT industrial revolution so as to facilitate the work effectively and efficiently.

KEYWORDS: Development of Science and Technology, the Industrial Revolution 4.0, the Internet of Things (IOT)

INTRODUCTION

4.0 industry term born from the idea of the fourth industrial revolution. European Parliamentary Research Service in Davies (2015) stated that the industrial revolution happened four times. The first industrial revolution occurred in England in 1784 in which the invention of the steam engine and mechanization began to replace human work. The second revolution occurred in the late 19th century in which the production machines are powered by electricity used for mass production. The use of computer technology for the automation of manufacturing started in 1970 to mark the third industrial revolution. Today, the rapid development of sensor technology, interconnect, and data analysis gave rise to the idea to integrate these technologies into various industrial fields. This idea was predicted to be the next industrial revolution.

Industry 4.0 is a phenomenon that is unique when compared to the three that preceded the industrial revolution. 4.0 Industry announced a priori because the event has not happened and in fact still in the form of ideas (Drath and Horch, 2014). The study mentions the term industrial revolution 4.0 first appeared in 2012, when the

German government introduced the use of technology strategy called Industrie 4.0. Industrie 4.0 itself is one of the project Modern German Technology Strategy 2020 (Germany's High-Tech Strategy 2020). The policy aims to maintain Germany in order to always be in the forefront in the world of manufacturing (Heng, 2013). The strategy is implemented through increased technology manufacturing sector, the creation of a consistent strategic policy framework,

Several other countries also participated in the realization of the concept of Industry 4.0, but using different terms such as Smart Factories, Industrial Internet of Things, Smart Industry, or the Advanced Manufacturing. Despite having the mention different terms, all of them have the same goal which is to improve the competitiveness of the industry of each country in the face of a highly dynamic global market. The condition is caused by the rapid development of the utilization of digital technology in various fields. From this, then the term industrial revolution 4.0. The word 'revolution' is used to indicate changes very fast and fundamentals, as well as the disruptive nature (long tatatan damage that has existed for many years). While the 4th wave indicates the sequence of events of the industrial revolution ever.

THE MAIN COMPONENT OF INDUSTRY 4.0

As in the explanation of Industry definition 4.0 as a continuation of the industry 3.0 which add connectivity instruments to acquire and process data, automatic network devices, IOT, big data analytics, cloud computing and cyber security is a major component in the industry 4.0. The connectivity device connected to the physical device industry. The goal is to receive and send data according to the specified command, either manually or automatically based on artificial intelligence.Device IOT in Industry 4.0 is known as IIoT or the Industrial Internet of Things, which was previously very useful for monitoring internally.

Table 1. Technologies used in Industry 4.0.
Tabela 1. Technologie stosowane w Industry 4.0.

Technologies in Industry 4.0.	Components and benefits
Data and connection	Large databases (*big data*) - data storage, processing and calculations Internet of Things (*IoT*) and communication between machines (*Machine to Machine*) - connection and transfer of information / data Cloud technologies (*cloud technology*) - centralization of data storage and virtualization of storage
Analytics and artificial intelligence	Digitization and automation of work based on knowledge - use of artificial intelligence and machine learning Advanced analytics - improved algorithms and data availability, implementation of advanced data mining systems used mainly for predictions
Human Machine Interaction	Touch interfaces and new GUI interfaces - possibility of quick communication using portable devices Virtual reality - use of optics, including augmented reality glasses, in industry, e.g. in a warehouse
Automated machine park	New production opportunities, e.g. using 3D printers - extended range of materials, increased precision / quality, possibility to obtain spare parts or raw materials immediately Advanced robotics - use of artificial intelligence, full automation of production, use of M2M technology Energy storage - production and storage of energy by performing daily activities in companies

Source: Lee, Kao, Yang 2014, Pfohl, Yahsi, Kurnaz 2015; Yu, Nguyen, Chen 2016

Outside of the key components of this, there is a set of technological improvement in the broader sense in Industry 4.0, such products may be subject (eg watches intelligent, goggles or gloves intelligent car applications autonomously (including drones) and big data. As initial summary, it can be the Industrial Revolution 4.0 can be explained as follows:

- Products and services: By flexibly connected via the internet or other network applications such as blockchain (consistent connectivity and computerization).
- Digital connectivityenables automation of the production of goods and services as delivered without human intervention (a system based on transparency and predictive power).
- Controlled network with decentralized systems, while the element (such as a manufacturing facility or transport vehicle) can make autonomous decisions (autonomous and decentralized decision making).

Industry 4.0 does offer many benefits, but it also has challenges to face. Drath and Horch (2014) argues that the challenges faced by a country when applying the 4.0 industry is the emergence of resistance to changing demographics and social aspects, the instability of the political situation, lack of resources, risk of natural disasters and the demands of the application of environmentally friendly technologies.   According to Jian Qin (2016), there is a wide gap between the technologies of the industrial world conditions today with the expected conditions of the industry 4.0. Research conducted by Balasingham (2016) also showed a reluctance to apply the factor 4.0 industry due to fears of the uncertainty associated benefits.

Based on some of these explanations in accordance with the submitted by Zhou (2015), in general, there are five major challenges to be faced is the aspect of knowledge, technological, economic, social, and political. To answer these challenges, it takes a great effort, planned and positioned on the side of the regulator (government), and educational organizations. According to Jian Qin (2016) technology development roadmap for the industry to realize the 4.0 is still not focused. This happens because the industry 4.0 is still a concrete manifestation of this idea has not been clear all its aspects so as to bring the various possible directions of development.

In the industrial application of 4.0 and the Internet of Things (IOT) not only focus on technology investment, but also related to human resources and corporate culture. Currently, Indonesia has entered a new era of industry / industrial 4.0 (Advanced Technology) which integrates between devices with the Internet and the use of big data (volume, velocity, variety, value and visibility) which marked the digitization of information and communication technology based on a variety of sectors.

Indonesia has a free market with material potential raw, where optimization of the use of appropriate technology, can be a booster of industrial upgrading, especially in the downstream. To meet the increasingly high demand, it takes technology effectively, intelligently and efficiently to produce products that are not only sufficient in quantity, but also good in terms of quality, even in terms of availability and affordability. In this case the understanding of the concept of 7 M (materials, men, methods, money, machines and tools, management and markets) from the concept of industrial management becomes an essential and strategic.

Table 1, Potential Benefits of Industry 4.0

Author	potential Benefits
Lasi (2014)	Faster product development, realizing the demand for the individual (product customization), the production of which is flexible and quick in responding to problems as well as resource efficiency.
Rubmann (2015)	Improvement of productivity, drive revenue growth, increasing demands for skilled labor, increased investment.
Schmidt (2015)	The realization of mass customization of products, utilization and improvement of data idle production time.
Kagermann (2013)	Able to meet individual customer needs, engineering and business processes into a dynamic, decision-making becomes more optimal, giving birth to new business models and new ways to be creative added value.
Neugebauer (2016)	Realizing efficient manufacturing processes, intelligent and on-demand (can be customized) at reasonable costs.

RESEARCH PURPOSES

This research can be useful for all readers and all the disciplines and industries in order to increase knowledge and insight. This article also aims to study the development of science and technology related to the industrial revolution 4.0 and IOT.

LITERATURE

In this study, the authors conducted a study of previous research on the study of the industrial revolution is 4.0 and IOT are as follows:

No.	Name researcher	Title and Year	Purpose	Method	result
1.	Hoedi Prasetyo and Wahyudi Sutopo	Industry 4.0: Assessing Classification aspects and Directions Development Research (2018)	Examine aspects related research and development direction of Industry 4.0.	Descriptive and conceptual.	Industrial 4.0 has fourteen aspects. Judging from its aspects, aspects of business and technology become the focus of research scientists. Judging from the fields of industrial application, most of the research done in the field of manufacturing. Judging from the amount, 4.0 Industry-related research experienced a significant upward trend.
2.	Murti Ning	4.0 Effect of development of the Industrial Revolution in the World of Technology in Indonesia	Learn and know understanding of the industrial revolution 4.0, developments, and challenges faced in the industrial age 4.0.	descriptive qualitative	Efforts should be made to address the challenges in the era of industrial revolution 4.0, among others: 1. identify strategic areas in order to increase the speed, flexibility, productivity, and quality output. 2. analyzing the impact of the use of technology in the long term, especially against the uptake of environmental labor and life. 3. Prepare the infrastructure, as well as educational programs and skills, so as to increase the capacity of human resources in the mastery of technology.
3.	Amiruddin	Industrial Revolution 4.0, the Internet of Things (IOT): Implications of the Supply Chain Logistics Services	4.0 Industrial applications discuss opportunities in the context of logistics management with conceptual research approach.	descriptive qualitative	Disclose opportunities in terms of decentralization, self - regulation and efficiency in logistics management. The application of Internet of Things (IOT) in the field of supply chain logistics services to bring some of the characteristics and benefits, which makes logistics services into a smart, transparent and efficient.

METHODOLOGY

This study was conducted using a descriptive, analytical and qualitative, and equipped with a literature study and observation of the industrial revolution 4.0 and the Internet of Things (IOT), including information technology that supports it. The main points are discussed in this study is the development of science and technology in realizing the industrial revolution 4.0 and IOT, aspects of the industrial revolution 4.0, identify

challenges and threats to be faced, as well as the analysis of the implementation of the industrial revolution and IOT.

ANALYSIS

The Industrial Revolution 4.0

Revolution is a social and cultural changes that take place quickly and the basic concerns or points of community life. In the revolution, the changes can be planned or without premeditation and can be run without violence or through violence.

While the industrial revolution is the rapid change in the economic field that is of economic activity agrarian to industrial economy using the machine in processing raw materials into ready-made materials.

Industry 4.0 is a comprehensive transformation of all aspects of production in the industry through the incorporation of digital technology and the Internet with the conventional industry. Schlechtendahl (2015) emphasized the industry definition of 4.0 to elements of the speed of availability of information, namely an industrial environment where the whole entity is always connected and able to share information with one another.

Kagermann (2013) that the industry 4.0 is the integration of Cyber Physical Systems (CPS) and the Internet of Things and Services (IOT and iOS) into the process industries including manufacturing and logistics as well as other processes. CPS is a technology to combine the real world with the virtual world. This merger can be realized through the integration between physical and computational process (embedded computers and network technology) are close loop (Lee, 2008).

Industry 4.0 can be defined as the industrial era in which all of the entities in them can communicate in real time at any time on the basis of internet technology and CPS in order to achieve the goal to achieve a new value creation or optimization of the existing value of every process in the industry.

Revolution industri has changed the way human beings work on the use of the hand to be using the machine. The term "Industrial Revolution" was introduced by Friedrich Engels and Louis-Auguste Blanqui in the mid-19th century.

Klaus Schwab, Founder and Executive Chairman of the World Economic Forum in his book, The Fourth Industrials Revolution Industrial Revolution fourth generation is characterized by the emergence of super computers, smart robot, a vehicle without a driver, editing genetic and developmental neuroteknologi that allows humans to better mengoprtimalkan brain function.

In the industrial era, this fourth-generation, large-size companies is not a guarantee, but the key to successful business agility with quick achievement. Therefore, companies must be sensitive and introspection so as to detect the position in the middle of the development of science and technology.

McKinsey and Company as a guide for introspection, to formulate the four stages of the company's position in the middle era of disruptive technologies, namely:

1.   Signal in the noise
2.   Changes in the business environment is more obvious
3.   Inevitable transformation
4.   Adaptation to the new equilibrium.

Industry 4.0 (smart manufacturing) is known as the industrial revolution and the fourth trend is the era of automation and interconnectivity / data exchange in manufacturing technology, which includes system cyberphysical, IOT, cloud computing (Cloud) and cognitive computing (big data and analytics), and mobility, as well as augmented and virtual reality (AR / VR). Some of the main supporting technology is artificial intelligence (artificial intelligence or AI), human machine interface, IOT, robots and 3D technology (digital printing).

Industrial Utilization 4.0 provide more capabilities to the manufacturer in the industry to visualize potential problems, look for alternative solutions and understand the impact of decisions made to improve operational reliability to a new level. Energy management can also be carried out efficiently, so that energy costs can be reduced.

DIGITAL WORLD AND THE FOURTH INDUSTRIAL REVOLUTION

There are currently several types of business models and work in Indonesia has been affected by the current digitizing for example:

1. Conventional stores that have already started to be replaced with a marketplace business model.
2. Or motorcycle taxi traditional position has already been started tergeserkan with online-based modes.

Report of the World Economic Forum (WEF), entitled: The Future of Job, identifies 10 key skills most desired by future world of work:

1. Complex problem-solving
2. critical thinking
3. Creativity
4. People management
5. Co-ordinating with others
6. Emotional intelligence
7. Judgment and decision-making
8. service orientation
9. negotiation
10. Cognitive flexibility

STRATEGY FACING THE DIGITAL AGE

How to respond to future front:

1. Commitment digital dipengembangan increased investment skills.
2. Always try and implement a prototype of the latest technologies, learn by doing!
3. Digging a new collaboration for the model form of certification or education in the realm of digital enhancement skills.
4. The conduct of collaboration between industry, academia, and the public to identify the demand for and availability of skills for the digital era in the future.
5. Prepared a curriculum that has incorporated digital materials related to human skills.

The four principles of the industrial revolution 4.0 in helping companies / organizations to identify and implement the scenario through:

1. Interoperability (suitability): The ability of machines, devices, sensors, and people to connect and communicate with each other via the IOT or Internet of People (IOP) or a known Internet for segala- (her) as the main element of Industry 4.0.
2. Transparency of information: information system capabilities create a virtual copy of the physical world with the digital factory model enrichment with the sensor data.
3. Technical assistance: The system's ability to help human assistance by collecting and making thorough information visualization and the ability of cyber-physical systems help people physically from an unpleasant job, too heavy, or unsafe.
4. Independent decisions: The ability of cyber-physical systems make their own decisions and perform tasks as independent as possible.

Social Revolution (Revolution Society) and the Challenges Ahead

The Stages of Revolution Community				
Society 1.0	**Society 2.0**	**Society 3.0**	**Society 4.0**	**Society 5.0**
Hunter atherer society	Grarian society	Industrial society	information society	Solution for better human life society

Briefly periodization of the industrial revolution can be explained as follows:

1. Wave Industrial Revolution-1 (Industrial Revolution 1.0). Occurred first in England, then spread to Europe and America in the mid 17th century.

2. The Industrial Revolution Wave 2 (Industrial Revolution 2.0). Is a continuation of the previous revolution, which occurred in the mid 18th century in Europe. This revolution is characterized by the use of electric power (electricity) to facilitate and accelerate the process of production, distribution, and trade.

3. The Industrial Revolution Wave 3 (Industrial Revolution 3.0). Thrive in the era of 1970's, mainly in the United States, with the introduction of the information technology (IT) automation and computerization to support production (production automation). Unlike the two previous industrial revolutions that require decades to spread revolution 3rd wave is spreading so rapidly to other countries, from Europe to the Asian mainland.

4. The Industrial Revolution 4th Wave (Industrial Revolution 4.0). 2000'an to the present era is an era of application of modern technologies, including Fiber technology (Fiber technology) and network systems (integrated network), which works in any economic activity, from production to consumption.

The World Economic Forum (WEF) said that the industrial revolution 4.0 is characterized by intermingling (fusion) technology capable of removing the boundaries driver of economic activity, both from a physical perspective, digital, and biology. With simpler language can be said that the assimilation of technology capable of integrating the human factor, the instruments of production, as well as operational methods, to achieve goals.

Characteristics of the industrial revolution 4.0 is marked by a variety of applied technology (applied technology), as advanced robotics, artificial intelligence, internet of things, virtual and augmented reality, additive manufacturing, as well as distributed manufacturing as a whole is able to change the pattern of production and business models in various industrial sectors , The understanding of these terms are:

a. Advanced Robotics, This instrument is the equipment used independently, which is able to interact directly with humans, as well as customize the behavior based on the sensor data supplied. Its main function is to shorten the waiting time and the time of service, resulting in efficiency.

b. artificial Intelligence (AI). AI is a system of computer-tech machines capable of adopting a human ability. It is intended to improve performance and productivity, as well as minimize the risk of errors that can be done by human labor.

c. Internet of Things (IOT). IOT is a technology that allows each instrument connected to one another virtually, so as to support the efforts Operational performance, oversight of the Performance of management, as well as an increase in value to the output.

d. Virtual and Augmented Reality, Virtual Reality is a simulation performed by the computer in forming an imaginary reality. This technology is able to manipulate the human vision so that seems to be in place or a different environment than the actual reality. While Augmented Reality is a technology that is able to generate information on the actual environmental conditions, and then digitally processed and used for specific purposes.

e. Additive Manufacturing, This technology is the automation of production processes through the technology of 3D (three-dimensional). This is a positive influence on the speed of processing and transportation of products.

f. Distributed Manufacturing, Is the concept of placing the production site and the integration of the production process, so that it can be as close as possible to the consumer to respond to their real needs. The aim is to achieve economies of scale, while reducing costs (cost efficiency).

Through the application of modern technology, the industrial sector is no longer solely focused on business development and an increase in profits, but also on the utilization and optimization of every activity, from the procurement of capital, manufacturing to services to consumers (World Economic Forum. Impact of the Fourth Industrial Revolution on Supply Chains).

In addition to a positive impact, the Industrial Revolution 4.0 also raises a variety of challenges that must be answered. The United Nations Industrial Development Organization (UNIDO) stressed that the presence of industry 4.0 can improve the economy of poor countries anddeveloping, as well as promote the establishment of development agendas such as those contained in the Sustainable Development Goals (SDGs).However, UNIDO is also concerned about the growing gap between the developed countries are able to apply modern technology, with poor countries and developing lagging behind in technological development. The problem is no less important is the impact of technology on the role of labor and welfare pemeratan.

UNIDO highlights some important points related to industrial development 4.0, namely:

a. Industry 4.0 is expected to be beneficial to human interests, the environment, and shared prosperity.

b. Industry 4.0 is expected to encourage the development of human capacity, thus becoming increasingly educated and skilled.

c. Access to technology is expected to be easily affordable, so that it can be applied in all countries.

d. Technological advances are expected to result in information disclosure.

e. Advances in technology are expected to shift the old paradigm, from the competition (competition) into the connection (connection) and cooperation (collaboration).

f. The application of the technology is expected to answer the challenges of climate change and environmental conservation efforts.

While efforts should be made to address the challenges in the era of industrial revolution 4.0, among others:

1. Identifying strategic areas in order to increase the speed, flexibility, productivity, and quality output.

2. Analyzing the impact of the use of technology in the long term, especially against the absorption of labor and the environment.

3. Preparing infrastructure, and education and skills, so as to increase the capacity of human resources in the mastery of technology.

Table 2, Aspects of Industry 4.0

No.	Aspect	Description
1	Standardization	Covering all efforts to set standards and references in industrial implementations 4.0
2	modeling	Covering an attempt to model complex systems in industry
3	Communication network	Availability of technology hardware or software for the exchange of information and data quickly and in real time.
4	Safety and security	All matters related to the security of the data processing system and safe use of technology to humans.
5	Human Resources	Covering an effort to transform human resources to prepare for the changes due to industry 4.0.
6	Law	Covering attempts to devise a legal framework in the implementation of Industry 4.0 (contracts, agreements, rules).

7	Resource efficiency	Covering all efforts to make resource efficiency (energy costs) as a result of the implementation of industrial technology 4.0
8	CPS technology	Everything related businesses CPS technology development, IOT, virtualization, which is becoming a key technology for Industry 4.0.
9	Smart Factory	Covering a manufacturing system development / production of automatic, intelligent, modular and adaptive.
10	Business	Involves finding new business models or business process changes due to industrial application 4.0.
11	design work	Includes the development and research related to changes in working system that will be faced by workers.
12	Services	Covering all the effort in processing big data and make the application utilization.
13	Management and Organization	Related change and development and organizational management model for industrial application 4.0.
14	Engineering products end to end	Engineering related products or services are digitized during its life cycle (smart product).

INTERNET OF THINGS (IOT)

With the Internet of Things (IOT), a human can make a connection between the engine and the engine, so that the machines can interact and work independently in accordance with the data obtained and diolahnya independently, the goal is for humans to interact with objects more easy, even so objects can also communicate with other objects.

On a broader scale, the IOT can be applied to the transport network that is through a policy of "smart city" that can help us reduce waste and increase efficiency in energy use, thus facilitating the work and the life we live.

IOT also provide security threats for companies with around the world. So the issue of privacy and data sharing on this IOT seems to be issues that require careful attention to users as well as companies involved in it. Another issue is the companies in particular will face the data with a very large amount generated by the devices that are connected to each other. So companies need to find ways to store, track, analyze and understand the amount of data to be generated. Talk of this IOT will continue to be discussed throughout the world until a few years later, to understand how the influence of the IOT to human life and must be understood that the opportunities and challenges will always arrive because of the proliferation of devices that join the IOT. Thus, it is wise if we can understand what it is IOT and the potential impact that can affect the way we live and the way we work.

Internet of Things (IOT) is an integrated network of physical objects or things that are stored in electronic devices, software, sensors, and Internet networks, which allows these objects to collect and exchange data. Internet of Things allows an object to be used and controlled via a remote on the existing network infrastructure, thereby creating the opportunity to combine the physical world and computer-based systems directly, and result in increased efficiency, accuracy and economic benefits.

IOT (Internet of Things) is a concept in which a particular object has the ability to transfer data (data miner) over the network without requiring any interaction from human to human (machine-to-machine or M2M) or from humans to computers as a virtual representation in internet-based structure. Illustration, smart car can run independently to various destinations without a driver, until Alexa voiced smart machine.

Internet of Things (IOT) is a network of physical objects or "things" that are embedded (embedded) with electronics, software, sensors and connectivity to enable it to achieve greater value and service to exchange data with manufacturers, operators and / or other connected devices. IOT is a concept that aims to extend the benefits of Internet connectivity are connected continuously.

Advantages and Disadvantages of IOT	
ADVANTAGES	**DEFICIENCY**
1. Data: The more information provided, the easier it is to determine the appropriate action based on existing data.	1. Compatibility: There is no standardization of the use of sensors, when a system with IOT device is damaged then we have to buy at the same vendor to replace it.
2. Tracking: In the inventory system with the help of a computer will be very easy to check the inventory, location and quality of the goods making it easier for us to manage.	2. Complexity: Behind the conveniences served, there is an IOT complex modules that are arranged in such a device requires expertise to treat regularly in order to keep the system running.
3. Time: the process of analysis and decision-making based on large amounts of data will be very fast.	3. Safety: All devices and computer programs vulnerable to hacking action.
4. Costs: Operating costs are cheaper.	

IOT data processing means which facilitate supervision and control of physical goods, used in activities such as: the use of individuals, offices, hospitals, tourism, industry, transport, animal conservation, agriculture and livestock as well as government.

ELEMENT CONSTITUENT:
1. Artificial intelligence (AI): technology development is done by collecting data, artificial intelligence algorithms, and the network is available. The illustrations make the order to the supermarket automatically, if the stock is about to run out.
2. Connectivity: create / open up a new and special. The illustrations create a small network between system devices.
3. Sensor: defining instrument, so that IOT became active system that could be integrated into the everyday real world.
4. The active involvement (active engagement): introduces a new paradigm for active content, products or services engagement.
5. Small devices that generate accuracy, scalability, and flexibility are good.

In the implementation of the real, all the objects are equipped with tool identification through bar code technology (barcodes), QR codes (QR Code) and Radio Frequency Identification (RFID). The illustration, the barcode can be seen which products are most widely sold and less enjoyed, in addition to predict in-stock products shall be increased or reduced, and no need to calculate the product manually.

The biggest challenge of the industry is the consistency of the policy development of downstream industries (downstream), so that the industry can enjoy the added value of domestic businesses and the Indonesian economy in general.

4.0 In the industrial era known patterns of automation / digitizing who rely on the Internet in various lines, that its application in industry can improve efficiency, productivity and quality by implementing IOT technology in its operations, such as making the design attractive packaging. Other terms such as breakthrough new technology advances such as AI, robotics, big data (data entry into the system), super computers and digitizing innovations that impact the industry, economic, social and cultural system order.

Industry 4.0 is considered as the integration of Cyber Physical Systems (CPS), and IOT and the Internet of Things and services (IOS) to the process industries including manufacturing and logistics as well as other

processes. The application of an impact on the progress of a larger (eg mapping the taste of food products per region, so that it can be made Product On Demand or POD), in addition to this will cause negative effects in the form of employment decline of humans and conventional business disruptions due to ketidaksiapannya.

To that end, the synchronization between the industry from upstream to downstream a key to improving the competitiveness of Indonesian products. Strong competitiveness will encourage the growth of export of these products in the global market, but the biggest challenge facing the industry in increasing exports is high dependence on raw materials. This is due to the upstream industry less able to grow and do not meet, in terms of both quality and quantity, while on the other hand continues to run downstream.

CONCLUSION

1. Through a roadmap for making Indonesia 4.0, set strategy for dealing with industrial 4.0 that encourage labor force in Indonesia continues to increase the ability and skills, especially in the use of technology IOT or integrate Internet capabilities with production lines in the industry massively, and utilization of teknlogi digital more optimal in the industry national as Big Data (machine learning), autonomous robots, cybersecurity, cloud, and relevant. It makes producers can collect all the information (data-driven) associated with the process, the feasibility of machine production, demand and raw material inventory fulfillment.

2. The industrial revolution 4.0 and the Internet of Things (IOT) not only provides benefits but can also pose challenges and threats.

3. Without IOT, then the Industrial Revolution 4.0 will not occur and the data has become the new currency. Illustration 4.0 in Indonesia industrial revolution shown by the presence of such as Go-Jek startup that allows people, for transportation or food can be ordered via phone.

SUGGESTION

1. The effects of the industrial revolution 4.0 is not a replacement workers, but changing his job, so it takes a skill-set of new, as well as to the government and the company / organization together with universities in Indonesia must prepare kuikulum and educational structure that is able to cope with changes in the skill-sets and demand from industry, In this case it can be said the industry 4.0 more driven by price and costs, and certainly lead to value-added and supply chain.

2. Indonesia needs to improve the quality of personnel with the skills and attributes of future technologies and the need for qualified human resources. Master the digital world, IT, IOT, AI and capable of creating a new system in order to facilitate the work and life.We can take advantage of modern technologiestoday that has undergone a revolution for hundreds of years. With the technology as it is today, we should be able to make new discoveries.

3. To deal with the industrial revolution 4.0 in the future then that is a necessary skill. the ability to solve the problems of foreign and unknown solution in the real world, b. the ability to coordinate, negotiation, persuasion, mentoring, sensitivity in providing assistance to emotional intelligence, c. consists of active listening ability, logical thinking, d. the ability to be able to do judgment and decisions with consideration of cost benefit and the ability to know how a system is created and executed.

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