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Strategy for Industrial Revolution 4.0 by Implementing the Internet of Things in Information Technology-Based Sectors

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Abstract:- The Internet of Things (IoT) is a concept in which an entity is embedded with technologies such as sensors, systems, and applications with the aim to communicate with each other, control, connect, and exchange data over the internet. This integration is part of the business or work that is currently needed. Work is not only focused on one or two things, but is connected cross-functionally, cross-sectorally and cross-functionally, cross-sectorally and cross-regionally in a sustainable manner. This paper discusses one part of the industrial revolution 4.0 (Internet of Things) which plays a very important role in connecting all systems connecting all systems continuously.

Keywords:- *Internet of Things, Revolusi Industry.*

I. INTRODUCTION

Industrial revolution 4.0 or often referred to as cyber physical system emphasizes on automation collaboration with cyber technology as the basis for combining information and communication technology in the industrial field. This industrial revolution 4.0 includes the 'Internet of things' or internet for everything, which is a concept with the aim of expanding the benefits of continuous internet connectivity (Khujamatov, Reypnazarov, Khasanov & Akhmedov, 2021; Pivoto et al, 2021; Abikoye et al, 2021; Aceto, Persico & Pescapé, 2019; Tao, Qi, Wang & Nee, 2019).

The Industrial Revolution 4.0 is triggering changes in various sectors, including replacing the role of humans who become increasingly knowledgeable and technological machines as workers in a continuously. Technology in the Industrial Revolution Industrial Revolution 4.0, in addition to the Internet of things, it is also known as Big Data technology (the concept of an ever-growing collection of data that continues to grow from continuous routine activities), Cloud routine activities), Cloud Computing (technology that uses the internet as a means of managing data and transactions), addictive manufacturing and artificial intelligence. manufacturing and Artificial Intelligent (Agolla, 2018; Kurt, 2019; Sima, Gheorghe, Subić & Nancu, 2020; Koh, Orzes, & Jia, 2019; Caruso, 2018).

The history and development of the Internet of Things, starting in 1999, first issued by Kevin Ashton, where he said that many predicted the Internet of Things is 'the next big thing' in the the world of information technology, because it offers potential that can be developed continuously. The goal of IoT is to change the way we live today by making smart devices around us to perform everyday tasks. Smart home (smart home), smart city, smart transportation, smart infrastructure and others are terms used in relevance to IoT (Spöttl & Windelband, 2021; Yang & Gu, 2021; Kumar, Zindani & Davim, 2019; Park, 2018).

➢ *Scope.*

The limitations of this journal focus on the manifestation of the Industrial Revolution 4.0 in Internet of Things (IoT) technology which includes several samples of its application from several industries such as the health industry, financial industry, retail industry, manufacturing industry, hospitality industry, and information technology-based financial industry.

➢ *Advantages*

Reporting from the kompas and binus sites, the positive impacts of the application of the Internet of things include:

- Ease of accessing information. Through smartphone gadgets, laptops, desktops or other technological devices continuously.
- Effectiveness in the field of production. The automation process replaces human labor human labor to reduce the cost of production costs, and increase production output.
- Increase in national income. Production can be completed in a time with good quality quality.

- Practical monitoring of activities. Iot helps control and monitor. All activities with ease, and can even recommend alternative activities or jobs that are easier.
- Creating skilled human resources. The transformation of human labor to machines still cannot replace the opportunity for knowledgeable human resources to be more creative and innovative. innovative.

➢ *However, it should also be noted some Negative Sides, Including:*

- Vulnerable to cyber attacks. The more advanced technology will always be accompanied by new innovations in cyber attacks, so updating the security system is important.
- High cost. Industrial revolution 4.0 for Internet of Things technology technology needs a long and sustainable investment. Not only in terms of infrastructure, but also the development of of reliable human resources.
- Leading to centralization of urbanization. Industrial Revolution opportunities that still centralized in big cities will create large migrations to big cities, so cities, so it is appropriate that this revolution should have a map that is more spread evenly.
- Impact on the environment. Pollution factory, network/frequency pollution, will result in higher physical waste and technology waste will increase. Good waste management system mandatorily implemented.

II. LITERATURE REVIEW

➢ *The Concept of Industry 4.0*

The concept of Industry 4.0 originated in Germany and has been recognized by other leading industrialized nations. The industrial revolution 4.0 builds on three previous technological transformations: steam power, which was a transformative force in the 19th century; electricity, which changed things in the 20th century; and the early computer era in the 1970 (Sony & Naik, 2020).

The term industry 4.0 originated in 2011 at Germany's Hanover Fair as one strategy to reduce increased competition from abroad and to differentiate Germany and the European industrial union from other international markets (Popkova, Ragulina & Bogoviz, 2019).

Five reasons why industry 4.0 is important and seems revolutionary in the age of information technology and in the current era of open markets are, first, industry 4.0 reduces the burden of challenges to make companies more flexible and responsive to market volatility, shorter project life cycles, higher product complexity, and global supply chains (Ślusarczyk, 2018).

Second, industry 4.0 enables the transformation of the modern economy to be more innovative and this will definitely increase productivity (Vaidya, Ambad & Bhosle, 2018).

Third, it highlights the role of consumers as co-producers and puts them at the center of all activities. activities. Product customization is the most important part in the product value chain. product value chain (Dalenogare, Benitez, Ayala & Frank, 2018).

Fourth, the industrial revolution put even humans into the center of production. production. As machines become smarter, jobs in production will be enriched and humanized. Simple manual tasks will disappear, workers will become coordinators who ensure smooth production and only intervene when machines call for action (Ghobakhloo, 2020).

Fifth, the industrial revolution will enable sustainable wealth. The old model of industrialization is disappearing. Economies and societies are increasingly recognizing the risks of globalization, the risks of job loss and the risks of resource shortages.

➢ *Industry 4.0 Includes Three Fundamental Aspects, Namely:*

- Digitalization and increased vertical and horizontal value chain integration: custom product development, digital customer orders, automated data transfer, and integrated customer service systems.
- Digitalization of product and service offerings: complete description of products and their related services through intelligent networks.
- Introduction of innovative digital business models: a high degree of integration between systems and technological opportunities of digital and integrated solutions.

➢ *Internet of Things (IoT)*

The internet of things (IoT) refers to the connectivity of electronic devices (often referred to as connected devices or smart devices), vehicles, software, sensors, actuators, and communication devices, which can send, move, and process information. send, transfer, and process information. IoT allows us to monitor and control devices remotely using a communication network, opening up the potential to combine computerized physical computerized systems with digital systems, and improve efficiency, accuracy, and productivity while reducing human interaction.

➢ *The Characteristics of IoT are:*

- Network connectivity between hardware devices
- Connected devices
- Connected smart devices
- Electronic tools. Software, sensors, actuators/drivers, and networks
- Objects for collecting and exchange data
- Objects that are remotely enabled and managed through lightweight infrastructure.
- Open up opportunities for the integration of the physical world (hardware) and digital systems.

➢ *The Main Elements of IoT:*

- Sensors: capable of changing IoT devices, precisely in terms of networking from passive systems to active and integrated with the surrounding environment.
- Artificial intelligence: (AI) is one of the common threads that "bring life" to IoT. With AI, devices can communicate intelligently. Moreover, IoT devices equipped with AI will be able to perform more complex analytical capabilities, such as data collection, managing networks, and even developing algorithms. Thus, the presence of AI in IoT devices also allows them to perform activities on their own without having to receive instructions from the user.
- Network connection: becomes a supporting component for IoT systems to be able to communicate smoothly. The connectivity required should be stable, but it does not need to be present in a large load size.
- Micro devices: The presence of micro or small-sized devices can increase the accuracy, scalability, and flexibility of IoT performance. Not to mention, the smaller the device will also have less cost value.

➢ *How the Internet of Things works*

The way the internet of things works is to utilize an argument from a programming language algorithm that has been arranged. Where, each argument formed will produce an interaction that will help hardware or machines perform functions or work. Thus, the machine does not require assistance from from humans anymore and can be controlled automatically. The most important factor of the running of the program lies in the internet network that connects systems and hardware.

The main task of the human is to be a supervisor to monitor every action and behavior of the machine while it is being controlled. actions and behavior of the machine while work. The biggest obstacle to the development of the Internet of things is in terms of resources that are quite expensive, as well as the preparation of a very complex network. The cost of development is also still too expensive and not all cities or countries have utilized IoT as a not all cities or countries have used IoT as their their primary needs.

III. RESEARCH METHODS

➢ *The Research Method used Two Approaches, Namely:*

- Descriptive Research, describing description that is accurate, factual, and systematic on certain facts;
- Case and correlational studies, to to examine the level of interrelationship of an existing fact/case and exploration of an event, process or activity.

IV. RESULTS AND DISCUSSION

➢ *IoT Architecture*

Technology has a wide range of applications, and the use of the Internet of Things is growing rapidly. Depending on the different application areas of IoT, it works as it has been designed/developed, but it does not have a standardized working architecture that is universally adhered to. The architecture of IoT depends on the functionality and implementation in different sectors. Here is a basic architecture consisting of four stages.

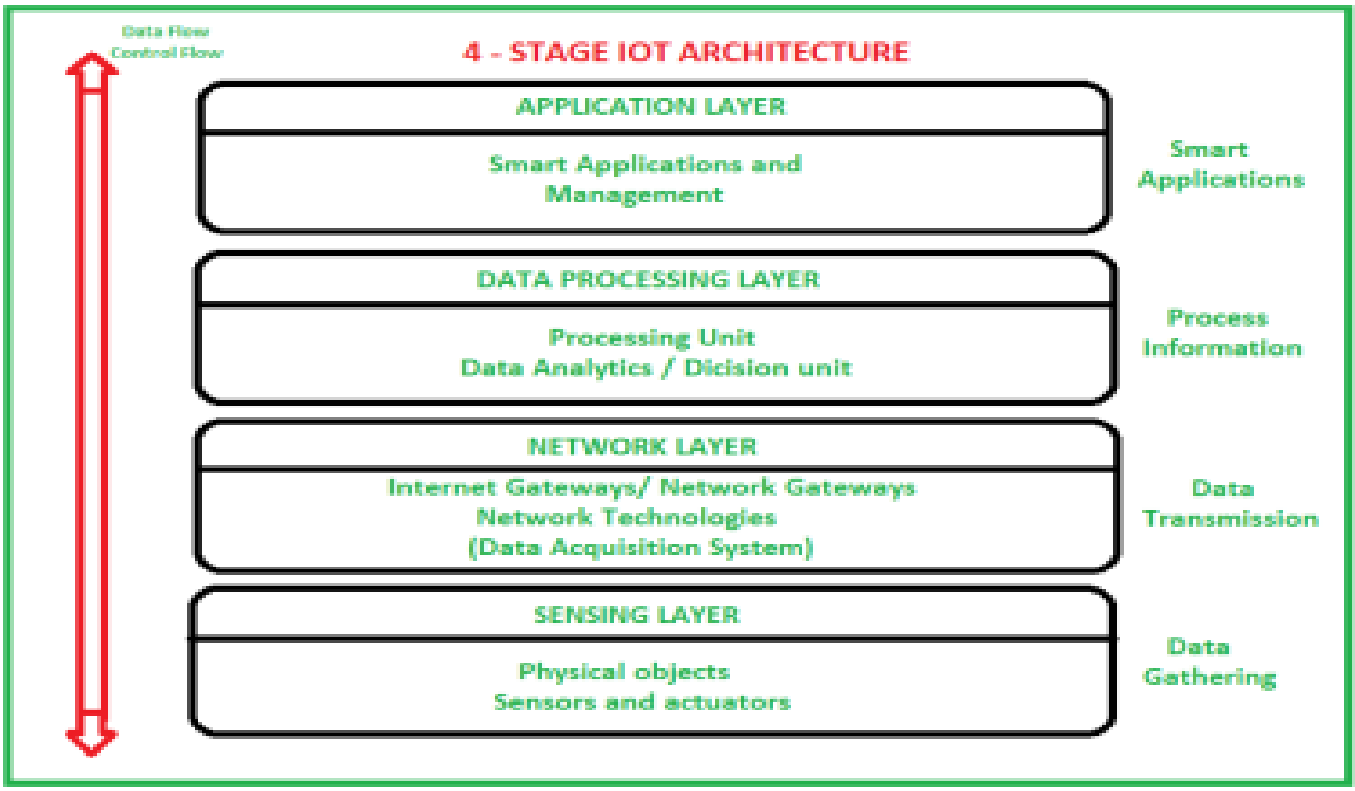

Fig 1 IoT Architecture in Four Layers

➢ *The Four Layers of the Architecture are Explained as Follows:*

- Sensing layer, a layer that contains sensors, actuators/movers which functions as a receiver of data (physical/environmental parameters), process the data and transmit it through the network.
- Network layer, which is an internet/network gateway, and data acquisition system. This data acquisition system performs the functions of aggregation and data conversion (collecting data, aggregating data and converting analog data into digital data. This layer also serves as basis of malware protection, filtering decision making.
- Data processing layer, is the unit of processing unit of the IoT ecosystem. This layer performs data analysis that has been previously processed, and sent to the data center where the data can only be accessed by a software application / business application, where data is monitored 24-7 so that if anomalous data is found monitor 24-7 so that if anomalous data is found, it will get an appropriate and fast response and escalation. appropriate and fast.
- Application layer, is a data center (cloud) application that manages end-user systems such as the agriculture, business sector, and various other sectors that are integrated with each other.

➢ *IoT Implementation in Various Sectors*

Companies that are considered most suitable for utilizing the Internet of Things are companies that implement sensor devices in their business processes, including business processes, including:

- Manufacturing Sector. Usage in this sector provides its own advantages by utilizing production line monitoring in order to proactive maintenance in the equipment when the sensor device detects a failure. The sensor will measure with certainty when any production output that is disrupted. With the the help of sensor alerts, then manufacturing companies can quickly quickly check the accuracy level of equipment or remove it from the the production system, so that it can be repaired quickly. This will allow the company to minimize operating costs, have more efficient working time, and improve performance. efficiency, and improve the performance of asset management performance.
- Automotive Sector. In this industry IoT is quite varied in its application, including:

✓ Used in vehicle predictive maintenance predictive maintenance of vehicles. Here the system is capable of monitoring the status of parameters in the car in real time, and car in real time, and periodically inform the driver if any parts that are experiencing problems or maintenance.

✓ Smart infrastructure and smartphone integration system. In addition to the integration of maps that are already running, the concept of smart cars (example: Tesla) as well as self driving, self-parking, connectivity with smartphones is the most interesting part of the IoT concept in the automotive sector.

- Transportation and Logistics Sector. The benefits of IoT from this sector include the use of sensors to track goods, temperature and air control, to complex air traffic management.
- Retail Sector. IoT in the retail business is widely expected to improve the customer shopping experience, and including maximizing the supply chain or distribution channel that is more efficient. In addition, from the merchants, IoT also helps merchants in the integration of end-to-end processes ranging from merchant registration, customer registration, to monitoring and reporting on problematic transactions. problem.
- Public Sector. The public sector is closely related to government-owned utilities. Not only electricity (PLN) or drinking water (PDAM), but also the payments are currently integrated with all digital wallet channels, but also short circuit detection electricity and clean water leaks should also should also be included in the IoT sensor.
- Smart city concept. Smart city concept smart city concept, or improving the intelligence of the city is an important role important role in the implementation of IoT. includes many applications that support monitoring the availability parking spaces, arrival and departure schedules mass transportation, congestion monitoring or road markings and traffic light. It even includes early detection of tsunamis and earthquakes for cities that are prone to disasters.
- Energy sector. There are many obstacles that arise in the energy industry, such as pollution problems, waste of resources, and many more With the presence of IoT, these problems are believed to be reduced. For example, IoT can create light sensors that can reduce the use of electrical energy electricity.
- Public sector/environment. An example of the internet of things in the general environment sector, where all human, plant, and animal activities can be monitored and supervised using IoT technology. For example, to conduct water quality research, an accurate and reliable source of information must be needed. With the help of the internet of things, it is possible to find valid and fast data sources. Not only that, the coverage of the geographical area presented is also quite wide and can reach more areas. With the help of big data, problems regarding the speed of data transfer and data reading are well covered.
- In addition, IoT is also capable of scheduling smart home devices such as washing machines, microwaves, refrigerators, and TVs.

- *The Role of the Internet of Things in the Industry Fintech and Online Shop.*

Since 2019 (pandemic period), online shopping activities and the role of integrated payments began to widespread to the public. The integration that occurs increasingly involves various parties (third parties). Shopping, paying bills, borrowing, payment, delivery, and complaint handling are now handled in an integrated manner. handling process is now handled well by the system. by the system. The issue of trust customers' trust in data security is still a threat to transaction actors, even the government, both national regulators such as Bank Indonesia and the Financial Services Authority, or the principal of the card service issuer issuers have usually provided data security certification (PCI/DSS) to data security (PCI/DSS) certification to the providers implementing online sales.

- *The Role of the Internet of Things in Media Streaming Media (Entertainment and Education)*

In addition to online shopping and fintech which has a high development development, educational media (education) and entertainment services also deserve attention. For example, campuses that already have SIAKAD (academic information system) have started to integrate with SPADA (Indonesian Online Learning System) which is managed in PDDIKTI (Higher Education Database). This integration involves students, lecturers, and other academic functional members. In addition, this application is also embedded with the concept of Kampus Merdeka which is able to involve entity lecturers and students across universities on one platform.

In addition, entertainment streaming media streaming media such as YouTube, Netflix, HBO, Spotify, and Disney. and Disney have also been integrated both from registration, payment, complaint handling, to cross devices (tablets, computers, smartphones), across operating systems (Android, Chrome OS, Mac, Windows), and can also be accessed simultaneously up to more than three devices in one account.

V. CONCLUSION

The internet of things is a concept where objects are able to transmit data using a network to perform work activities without the assistance from humans or interaction with computer devices. The elements of IoT consist of several parts, such as connectivity, Artificial Intelligence (AI), small small systems, sensors, and active engagement. The workings of IoT are created by creating argumentation algorithms programming algorithms, to generate program interactions with the internet network as a link between the two as a link between the two things between these two things. Examples of IoT applications can be done in various fields such as health, transportation, environment, energy, and so on. The main benefit of the internet of things are the achievement of efficiency, effectiveness, and connectivity.

The Industrial Revolution 4.0 is not only the Internet of Things (IoT). We also already recognize Artificial Intelligent (artificial intelligence), Blockchain (digital financial ledger of digital financial transactions), Big data, Robotics, Neurotechnology, Nanomaterials, Additive Manufacturing, Cloud Computing, Energy Saver, and Synthetic Biology. The first part of the journal that discussing IoT is largely based on the situation of the past few years, where dramatic growth of internet-connected devices has internet-connected devices has changed the way people, households and businesses interact with each other.

These connected devices range from very simple such as digital video digital video devices, to complex such as payment transactions that involve multiple payment types such as Quick response code/QR, Digital Wallet (Dana, Flip, GoPay, Ovo), Direct Debit (Bank), and Credit Card (Local and Credit Card). (Bank), and Credit Card (Local and International). International). IoT devices represent a growing constellation of of gadgets and tools designed to collect, exchange, and process information over the internet to equip their users with easy access to a various services and information. The Internet of Tnings is a concept technology that is currently transforming and redefining almost all markets and industries in a fundamental way. The last five years have seen an inflection point where fragmentation efforts connecting/integrating machines, functions and systems in various fields of industry based on information technology is now transforming and materialized into a globally comprehensive vision.

The question is, technology development and life cycle is accelerating. How will the development of IoT technology in the future, whether Our human resources are ready to anticipate it. Knowledge-based world is important to do continuously.

- *Implication Managerial*

This research has the potential to transform the way the information technology sector operates and benefit governments, communities and schools by creating new opportunities, improving efficiency and preparing the workforce for an increasingly connected and sophisticated future.

This research can assist the government in formulating policies and strategies to advance the information technology-based economic sector by utilizing the Industrial Revolution 4.0. The implementation of the Internet of Things (IoT) in the information technology sector can improve operational efficiency and system security, which are the government's main concerns in maintaining critical infrastructure. The government can use the results of this research to design relevant education and training programs for the workforce in the face of technological change.

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