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The relationship between internet growth and implementation of the internet of things

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The relationship between internet growth and implementation of the internet of things

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Abstract. Internet of Things (IoT) is actually not new in the world of information technology. Indonesia became the second largest country in terms of IoT implementation in Southeast Asia, Indonesia only lost to Thailand. The implementation of IoT has been carried out by several local companies such as Blue Bird, Pertamina Patra Niaga and Gojek. The IoT application has also been developed by several children of the nation such as Spekun and Qlue who are currently in the stage of business development. In the implementation of IoT several things become important to pay special attention to, including security systems, platforms, operating systems, communication standards and data analytics. Seeing the rapid development of IoT around the world, the Indonesian government is expected to be able to drive the development of IoT in Indonesia by assisting the development of information technology infrastructure and standardization in the implementation of IoT. In addition, the government is expected to be able to encourage the development of human resources that have capabilities not only as workers' resources but also as creators of new technologies for the development of IoT. In the end, cooperation between the government, the private sector and the support of the Indonesian people is expected to make Indonesia have competitive advantages in the development of IoT, so that it can attract investors to enter Indonesia.

1. Introduction

Internet has become one of the necessities of life for the world community today, it cannot be said to be a primary need for all humans, but rather it is a necessity for most people both in urban and urban areas. The internet originally came from the ARPANET (Advanced Research Project Agency Network) project which was given the task of creating a packet switching system that allowed many computers to communicate on one network [1]. October 29, 1969, ARPANet delivered their first message: a "node to node" communication from one computer to another [1]. Technology continued to grow until the late 1970s after Robert Khan and Vinton Cerf developed the Transmission Control Protocol and Internet Protocol (TCP/IP). A standard about how to communicate between one computer with another computer. Without these standards, one computer and another will have



difficulty communicating. Today, the internet is becoming one of the necessities of life for humans. The internet opens people's insights and knowledge about a world without limits. The internet can connect not only one computer with another computer, but also connects between people in different parts of the world. Distance is meaningless, access to information is not limited by distance. Finally, starting around 2005, the world of internet was introduced to cloud computing. Cloud computing involves the implementation of several server networks that can be remote by network applications, which process the storage system. Storage system or storage system can be accessed and empowered to store data or run computing using servers that are connected to the cloud network. Cloud computing is able to present the latest solutions to computing problems, because it succeeded in reducing costs for the physical infrastructure of a network or server. PwC (PricewaterhouseCoopers) conducted a survey of around 489 global companies regarding cloud computing. 77% of CIOs and senior executives plan to switch to cloud computing [2].

At present, technology has developed even further. People began to need information technology not only as a means of communication and information search, but people began to use data that is spread across the internet to develop business, conduct research, determine market segmentation and to develop new knowledge. Internet of Things (IoT) has simple terminology to explain. IoT is explained as taking all the material (material, information, data) that is in the internet network throughout the world. All of this aims to utilize the data for the purpose of research, product development, market segmentation, or for campaigns, and many other things depending on the objectives of the subjects who use the data and information. Many industries can use IoT as a system that can help in business optimization. The main purpose of this article is to describe how the use of the internet of things has increased significantly in the current era of the 4.0 industrial revolution, so that its contribution to the business world is also increasing because of the effectiveness and efficiency of business processes in each company, the industrial world including its implementation in regulations at the government.

2. Literature Review

The internet is one of the forerunners of the development of information technology that we feel the benefits today. The development of information technology initially was not as fast as it is today, where the technology can be updated every year. At the beginning ARPANET developed the TCP/IP protocol as a standard of inter-computer communication systems, communication can only be done within the internal system of choosing the Department of Defense of the United States government. Unlike other inventions, such as steam engines, incandescent lamps, which were invented by an inventor, the Internet is the invention of the collaboration of various researchers throughout the world. At the beginning of the internet began to develop, only 4 units of computers that are connected and can communicate with each other on ARPANet. Only two years later in 1971, the University of Hawaii used TCP/IP as a standard for communication between computers. And in 1973, London University College also began to use communication facilities between computers [3]. In the late 1980s, Cerf's protocol transformed the internet into a worldwide network. Around 1991, Swiss scientist Tim Berners-Lee introduced the world wide web, where the internet makes it easy to share and send data between one person and another, the web makes information accessible to everyone around the world. Bernard Lee introduced the Internet as we know it. In 1993, the University of Illinois introduced the first graphic web for windows under the name mosaic. In the same year, at the university came online journalism. In Indonesia, the internet was introduced by Onno W Purbo, Putu Surya, Firman Siregar and many other figures who introduced the internet.

Quoted from dailysocial.id, APJII (Association of Indonesian Internet Service Providers) released some data regarding internet usage in Indonesia. 2017 data from APJII shows that in urban areas, internet usage has reached 72.41%, this is comparable to the growth of total internet usage in Indonesia, which grew to 8% compared to 2016 or around 143.26 million people in Indonesia have used the internet [4]. This happens because one of the optical cable infrastructures has reached regions throughout Indonesia. In 2020 the Palapa Ring project, the fiber optic cable interconnection project, is

targeted to connect all major regions in Indonesia. This is expected to encourage the use of the internet in Indonesia, on the positive side of course.



Figure 1. Palapa ring (ICT Whitepaper Indonesia 2012, Loc.Cit).

Indonesia is one of the important countries in the use of the internet in Southeast Asia. With active internet users reaching 143 million people (APJII data for 2017) Indonesia is one of the largest internet users in Southeast Asia. We are social data shows another number, 137 million internet users in Indonesia, or about 50% of Indonesia's population are already using the internet. The difference in data claims is possible because in Indonesia, one person can have more than one cellular phone number that is often used to get internet access, which can cause bias in internet user surveys. Figure 2.

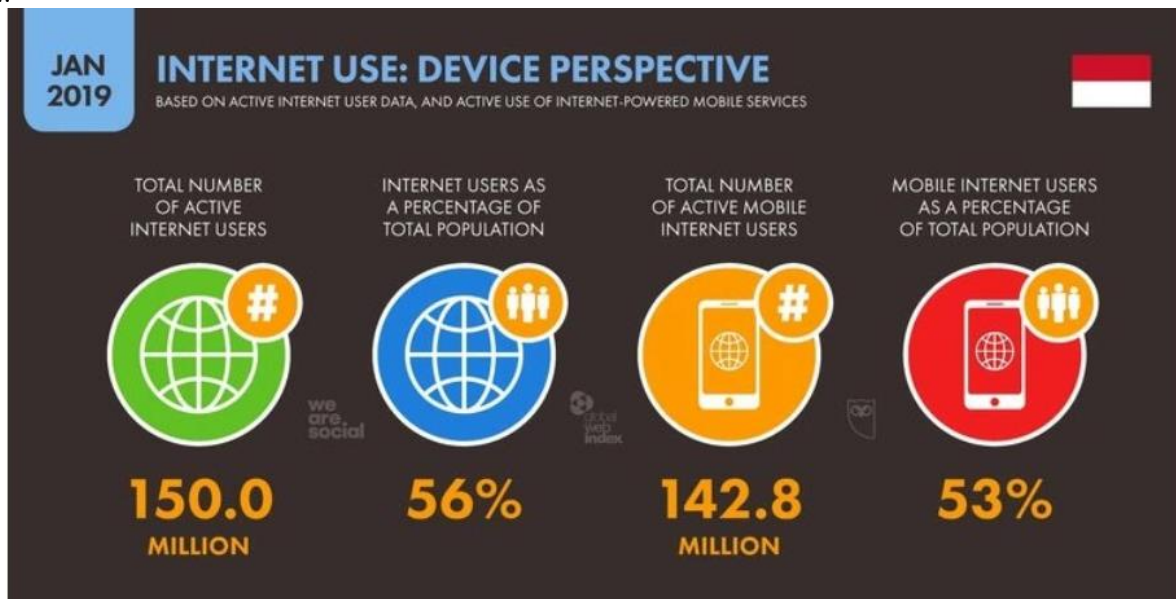


Figure 2. Indonesia internet use (<https://websindo.com/indonesia-digital-2019-internet/>).

The number of internet users in Indonesia will be difficult to beat by other neighboring countries such as Malaysia, Singapore, Vietnam and other southeast Asian countries, because in terms of population, the total population of Indonesia is far greater than the total population of other countries. Studies conducted by Google and AT Kearney show that in the last 5 years (2013 - 2018) the growth of digital capital companies grew to 68x in 5 years due to the growth of e-commerce and ridesharing businesses [5]. Total venture capital transactions in the first 8 months of 2017 reached \$ 3 billion, or more than double the transactions in 2016 of \$ 1.4 billion. Google and AT Kearney, from the results of their study also see the potential for growth in venture capital in Indonesia, because the growth of venture capital in Indonesia is currently still below the growth of Indonesia's GDP. There is still plenty of room for VC to grow in Indonesia. Google / AT Kearney in his study results also show consumer trend data which can be seen in the graph below. The visual graph below shows the trend of increasing GDP in Indonesia will be in line with the increase in online banking transactions, smartphone penetration, online shopping and higher education. This shows the role of the internet in influencing changes in people's lifestyles. People nowadays tend to use internet facilities instead of having to come to the bank to transact directly. Figure 3.

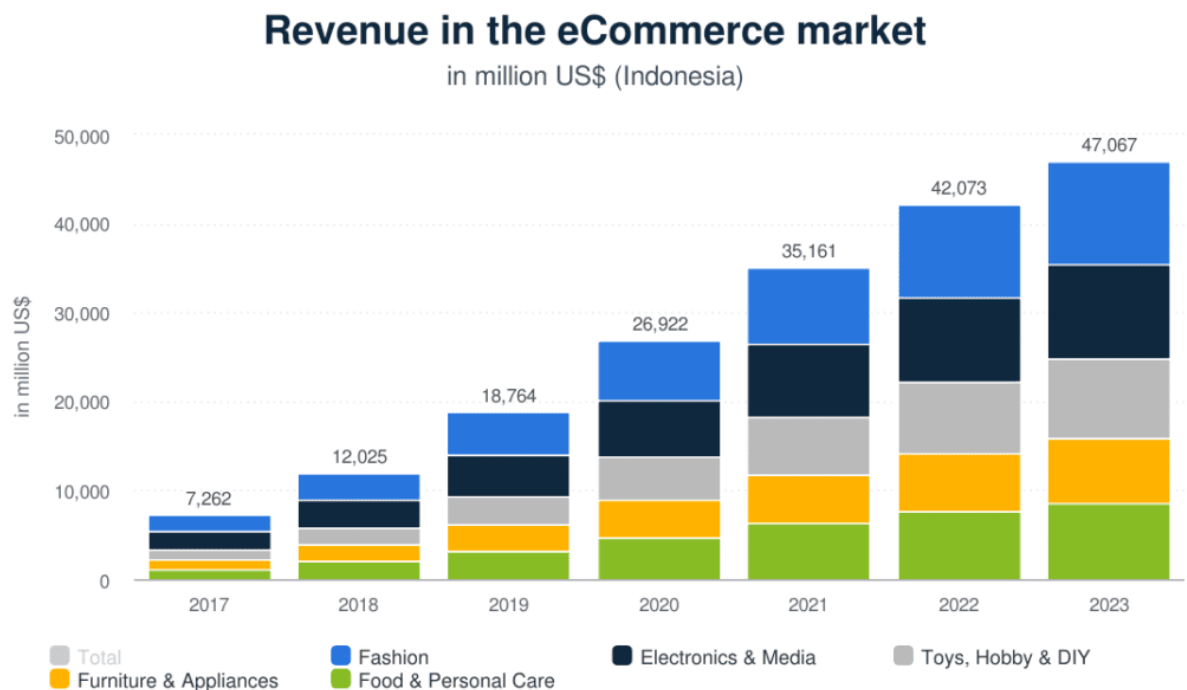


Figure 3. Revenue in the eCommerce market.

Source: <https://janio.asia/id/sea/indonesia/indonesia-q4-consumer-overview/>

The growth of ecommerce in Indonesia has been quite significant in the past few years, where it started with person-to-person transactions through online forums such as Kaskus, then began to grow ecommerce companies such as bukalapak, tokopedia, shopee, which became the new marketplace in the retail world. This has changed the lifestyle of the people in general and Indonesian people in particular. We are social conducting a study to find out the extent of internet usage in Indonesia. Some data shows that many internet users in Indonesia use the online system to transact purchases of goods and services online. Some days are more lucrative than others in each year. Find out which Indonesian major shopping events you should mark down this year to win big in Indonesia. Brought on by the rising popularity of online retail, eCommerce shopping dates have become a major cultural

phenomenon worldwide, making its way into consumers' shopping calendars and changing the retail landscape as we know it [6]. Figure 4.



Figure 4. Major eCommerce Shopping Event in Indonesian.

Source: <https://janio.asia/id/articles/major-e-commerce-shopping-events-in-indonesia/>

3. Methodology

To understand the development of Internet technology and its relation to the Internet of Things (IoT) in its use for effective performance in industries in Indonesia, the study of the Internet of Things (IoT) is discussed in this article. In order to find out the impact of the development of the internet and the use of the IoT application in Indonesia, the study of these two things is based on literature studies from reliable news sources. Deductive analysis is conducted to understand the general things that occur in the implementation of the Internet of Things (IoT) in Indonesia, which are then followed by an analysis of applications in several industries, until finally how the impact of the Internet of Things (IoT) on investment attractiveness in Indonesia. Case studies on the implementation of the Internet of Things (IoT) in two large companies in Indonesia, namely Blue Bird and Pertamina Patra Niaga, as well as in two start-up companies in Indonesia, Qlue and Spekun, how they implemented IoT to help develop their business and survive in the information technology era is discussed in a separate chapter to better understand IoT applications and impacts in business. Analysis and discussion on the potential implementation of IoT in Indonesia will be able to provide an overview of the potential for its application in several industries and how it impacts on industries in Indonesia in general. Closing with the conclusions from the analysis and discussion that have been done so that it is expected to be input for business and industrial development in Indonesia as well as an input for policy makers to be able to support the development of the internet in Indonesia

4. Results and Discussion

In the discussion section will be explained about the Internet of Things (IoT), supporting technology, IoT applications in Industry, and IoT applications in manufacturing. Followed by an analysis of the potential implementation of the Internet of Things (IoT) in the industry in Indonesia as a whole and its impact in attracting investors to invest in Indonesia.

4.1. Internet of Things (IoT)

From some of the data on internet usage in Indonesia, then we will discuss about internet usage on an Industrial scale in Indonesia. Internet of Things (IoT) makes everything both data and information that is spread on the internet can be accessed online and can be used for various purposes. IoT is often translated as the ability of an object to transfer data without interaction from human to human or machine to human. In this case, with the development of sensor technology, IoT becomes a new concept in information technology. At this time, the sensor can directly transfer data both in real time and certain time without the need for human involvement in the process of sending data and receiving data.

There are several technologies needed in the implementation of IoT [7]:

1. IoT Security

In IoT, security is very important. Data transfer between devices and between control machines and sensors, vulnerable to eavesdropping or breaching data. Until now there is no single technology that is 100% safe from cyber attacks,

2. IoT analytic data

Data collected by sensors and systems can be used to determine trends in consumer behavior (in manufacturing means machine behavior). This data can later be used to develop products, measure system efficiency, identify system weaknesses, and be used to change business strategies. A data analyst must be able to collect data, process data, summarize data and interpret data appropriately. Reading the results of data processing that is not appropriate will cause errors in decision making.

3. IoT Operating System.

Conventional operating systems such as Windows Server or some other product cannot be used in an IoT system. However, some special OS has been created for IoT systems such as: RIOT, Contiki, Yottos. There are several operating systems developed by each technology company such as IBM and Hitachi that focus on developing IoT as one of their business products. The memory for the IoT application is expected not to consume too large a resource, because IoT itself combines several existing computer resources, a computing system that is not centralized so that it does not require large memory resources.

4. IoT Sensor and Processor

Sensors and processors are important in the IoT system. The sensor helps detect some of the parameters needed and transmits directly into a single microcontroller (MCU) that contains a simple processor. This MCU will later collect and process the data taken by the sensor to be changed in binary code which is then transmitted using transmission media such as wireless, Bluetooth or internet cable (which is becoming obsolete).

5. IoT Platform.

IoT This platform must provide all the needs of the IoT system such as data collection facilities, data analysis, device management to the ability to communicate with existing systems such as ERP. This platform feature is absolutely there because without these features, the IoT system will not run smoothly and can even be called not meet the classification to be called an IoT.

6. Event Stream Processing.

Thousands or even millions of devices will be connected to the IoT system, the need to do thousands of processes in seconds absolutely absolute. The old system "store and process" will greatly hamper the computing system on IoT because it will take time in the process, for that it is necessary to look for technology in doing all processes at the same time. Distributed computing technology is one of the breakthroughs, where one computer can use other computer resources that are in a network with the record that the computer has access rights. This system is directly able to maximize the available resources of a collection of computers in one network. Previously, when each computer worked individually, the process would run slowly, and if the computer was not processing, the existing

resources of the computer were idle. This gap is an opportunity for the development of distributed computing systems, which in turn is very useful for the implementation of the IoT system.

7. IoT standard and Ecosystem.

Ecosystems and standards become an important part in developing an IoT system, where without standards, how can one device with another device or between one network cluster with another network cluster can communicate. Some standards have been set by ITU a non-profit standardization institute for communication and information technology. In addition to standards, it is also necessary to develop ecosystems. Without an ecosystem that aims equally, then IoT will not work. The purpose of this ecosystem is to exchange data, to later be analyzed and become the basis for decision making [8].

Wireless technology, sensors, RFID become one of the key parts in the development of IoT. The power plant system, for example, no longer needs to rely on humans to send data on the condition of pressure steam, steam flow, steam quality for electricity generation. Pressure, flow, quality sensors in real time can transmit data to the power plant system as a whole. Previously, humans needed to record every hour of that matter, but now, humans only function as a monitoring function, data transmission is carried out directly by sensors, while the system performs data processing, and the system will give status of how the power plant conditions are in real time. In the manufacturing industry, for example, IoT can help manufacturers to work smarter, more efficiently and experience increased productivity. This applies not only to technology-intensive manufacturing, but also to labor intensive manufacturing.

4.2. Application of Use of IoT in Industry

Some industries have started using IoT as one of the system tools used in their industrial applications. This chapter will discuss the application of IoT in various industries that we can find in Indonesia [9].

4.2.1. *Blue Bird*. Reporting from id.techinasia.com on August 26, 2019, Blue Bird as one of the largest taxi companies in Indonesia in collaboration with Telkomsel, one of the largest cellular service providers and digital companies in Indonesia, developed the implementation of IoT in the blue bird service. This IoT-based service is used as a meter monitor, sending passenger orders, tracking taxi positions, communication between drivers with passengers or drivers with the central office, to payment applications. The purpose of this IoT implementation is to improve blue bird services to passengers, provide visibility about the company's asset performance such as the vital condition of the Blue Bird fleet, as well as to find out the amount of expenses incurred from the blue bird fleet caused by fleet maintenance costs. It is hoped that by implementing this IoT, Blue Bird can compete with an online transportation fleet which in recent years poses a considerable threat to Blue Bird. By the end of 2019, it is expected that around 10,000 units of the Blue Bird fleet will already use the IoT application, and are expected to grow to 25,000 units in the second quarter of 2020.

4.2.2. *Pertamina Patra Niaga*. Reporting from katadata.co.id, Pertamina Patra Niaga implements the use of IoT to overcome management problems in refueling fuel. Pertamina Patra Niaga in collaboration with Telkomsel provides a solution called Intank (Intelligent Tank Monitoring System). This technology monitors the level sensor in the fuel terminal storage tank, and is also used to monitor the distribution meter sensor line. By implementing IoT technology, it is expected that the availability of fuel oil in some fuel terminals will not be in a vacuum. This helps the supply chain from Pertamina Patra Niaga to work more effectively and efficiently.

4.2.3. *Spekie*. Reporting from dailysocial.id, Spekie is one of Telkomsel's output products in collaboration with Banopolis which is developing yellow bicycle rental cooperation at the University of Indonesia (UI) campus. Spekie or acronym of Yellow Bike is a ride-sharing application for borrowing bicycles at a certain time and one point to another. This bicycle loan system is equipped

with RFID technology, where bicycles can only be parked at certain parking docks that can detect RFID. Pole and dock facilities are provided by Spekun at several points on the University of Indonesia campus.

4.2.4. Qlue. It is an IoT application of the work of the nation's children aimed at creating an IT-based public complaints platform for later damage to the regional government, in this case specifically the DKI Jakarta provincial government. Qlue has 4 (four) types of derived applications, namely QlueMyCity, Qluster, QlueSafe, QlueVision. QlueMyCity is addressed to local governments, both the Jakarta provincial government and the municipal government in Jakarta. Qlue submits complaints from the photo-based community regarding traffic conditions, road damage conditions, complaints about incidents, poverty, taxes, and so on. Qluster is an application aimed at developers of independent cities, housing and apartments that contain a dashboard of citizen reports, IPAL payments, news and services. QlueSafe is an application that provides information to security officers, police and regional security officers who aim to convey information from the public about security threats, terrorism or fraud that can help security forces work faster. QlueVision is an application based on Artificial Intelligence (AI) that can perform face recognition, count the number of pedestrians, motor vehicle plate recognition that helps companies or governments in analyzing the number of people or searching for people [10].

4.3. IoT (Internet of Things) application in Manufacturing

During these decades, the manufacturing industry has placed the production system as one of the competitive advantages they have. Toyota is one of them, the automotive company based in Japan is implementing an effective production line as one of their competitive advantages. Toyota has succeeded in optimizing their production line so that economically, Toyota is able to produce quickly and efficiently so as to reduce production costs. This is difficult for their competitors to achieve. The internet is not just about censorship and big data. For Toyota, it's also about reshaping mobility in all its forms through vision, connectivity and services designed to please end users "(Sandy Lobenstein). For Toyota, IoT is one of the enablers in the strategy to face automotive business competition today. The Toyota Research Institute (TRI) uses a database for future car development, one of which is the development of autonomous vehicles or in other words the development of self-driven cars. The IoT application is just the beginning for Toyota, which uses very small sensors that can be placed anywhere in the car section. We imagine what if we place this sensor in the tire or brake system of the car since in the production area, the sensor will provide feedback to the developer or production manager regarding the quality or weakness of the tire or breaking system during testing [11].

4.4. Potential Analysis of the Implementation of the Internet of Things (IoT) in Indonesia

Based on previous data regarding the potential for internet growth in Indonesia and various examples of IoT applications both in Indonesia and abroad, we can take a number of things to analyze the potential implementation of the Internet of Things (IoT) in Indonesia [12]:

1. Indonesia has great potential to implement IoT in all social aspects, not only limited to business aspects, as has been done by Qlue. This potential is supported by data which says that around 50% of Indonesia's populations are users the internet so it's not difficult to apply IoT in all aspects.
2. Indonesian companies need to immediately transform in the digital world by trying to apply IoT in their business, this will help companies develop products, businesses, seek market segmentation, be aware of consumer behavior so they can get feedback on product development.
3. Government agencies can also apply IoT to find out in real time developments in the community. The government can utilize applications like QlueVision to find out traffic conditions in various regions so that it can reduce congestion or be useful in making decisions in infrastructure development.
4. BUMN-BUMN in Indonesia must start using IoT in their business performance analyst. Like PLN, they can use IoT for their power plants, use data to compare the efficiency of one power

- plant with another, plan maintenance schedules well between plants so they can avoid power cuts.
5. The constraints of reliable and inexpensive internet access are one aspect that needs the government's attention in terms of support for IoT development in Indonesia. Digital infrastructure development is absolutely necessary in the hope that it can form an efficient system not only in government but also in industry. IoT can be one of the competitive advantages for the Indonesian government to attract investors to invest in Indonesia. With a good IT infrastructure, investors from technology-intensive industries will be happy to invest in Indonesia, because they have the opportunity to apply IoT in their industry in the hope that business will make them more efficient so that they have sufficient competitiveness to compete with competitors.
 6. Security system, is one of the biggest obstacles faced in the implementation of IoT. As said before, there is no internet system in the world that has 100% security quality. Companies that implement IoT must pay more attention to the security system because this becomes a very important thing in implementing IoT. Security system leaks will make important company data, consumer data maybe even personal data from employees at the company can be stolen. Update your security system regularly and do a security system checking into something that is absolutely necessary to continue.

5. Conclusion

From the discussion above about IoT, conclusions can be drawn regarding the potential of Internet of Things in Indonesia:

Internet of Things is an important element in achieving excellence in business. Internet of Things is not only useful for developing business lines or gaining a competitive advantage, but Internet of Things can be a system that can help governments and communities have better communities. Internet of Things is very dependent on the reliability of the internet system and system security, so these two things become important factors in the implementation of Internet of Things. Internet of Things can be an investment attraction for investors who want to invest in Indonesia by seeing that IoT can help the industry to become more efficient and competitive.

Indonesia's potential is huge to enter into the Internet of Things trend, where it is hoped that Indonesia will not only become an object country for using IoT but be an active country in developing Internet of Things both through research and through human resource development. Some local companies have started implementing Internet of Things such as Pertamina Patra Niaga, Blue Bird, and Gojek. IT infrastructure support from the government is one important point for the rapid progress of the implementation of Internet of Things in Indonesia. National standards for hardware and software need to be developed by adopting standards that are already applicable globally. It is hoped that this standard will support the development of the implementation of Internet of Things in Indonesia, not even a barrier.

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