Internet of Things Industry in Supporting Industrial Revolution 4.0

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Abstract—**Nowadays the Internet has entered various aspects of human life. Seen from the concept of e (electronic), such as e-government, e-commerce, e-news etc. Regarding internet business, obviously very influential on the business environment. Every business that wants to develop must be connected through the internet to be able to reach consumers who spend more time in cyberspace. The list of successful companies in the world is also dominated by communication technology business people connected to the internet, such as Google, Facebook, Microsoft and Apple. Internet of Things (IoT) is a busy term but still lacks understanding. Until now, there is no standard definition of the Internet of Things, in short, IoT is communication between objects through networks such as the internet. Some of the big companies that are working on IoT include Intel, Microsoft, Oracle, etc. The vision of the Internet of Things itself is that the Internet extends to the real world and integrates with everyday objects, both can be controlled from a distance or a distance and is not limited by space and time. Current predictions, IoT will become "the next big thing" in the world of information technology, because it offers a lot of potential that has not been explored. The method used in this Internet of Things technology is wireless or automatic control without knowing distance. The implementation of IoT also follows the wishes of the application developers for example determining the control room, access distance that can be controlled, network speed and other requirements. IPv6, 4G and Wimax technology can help the implementation of IoT be more optimal and enable a wider coverage area. The implementation of IoT in Indonesia so far has been realized through several products from several operators, one of which is Speedy Monitoring provided by PT. Telkom which functions as a facility of capture, recording and monitoring the condition of a particular room or area by utilizing an IP Camera that is connected to the Speedy network. In terms of the benefits of IoT has many benefits that help human activities, but in terms of regulation, IoT especially in Indonesia does not yet have the latest regulatory system (Positive Law). At present there are also IoT devices that use the access concept of Permanent Roaming, which directly occupies the operator network in Indonesia. Therefore it is necessary to study the Indonesian IoT industry and also business analysis related to the implementation and planning of IOT in other countries**.

Keywords: Internet of Things, Industrial Revolution, Big Data

I. INTRODUCTION

Internet of Things (IoT) in Indonesian is briefly about the internet. According to Wikipedia IoT is a network of embedded physical objects or "things" related to electronics, software, sensors and connectivity, which means through an embedded computing system that is able to incorporate it into existing internet infrastructure.

In a simple sense, IoT are things that will be directed to the internet, everything. For the sake of ease of life and smooth business. It is intended that someone can make the best use of their daily time.

The term "Internet of Things" was first documented by a British visionary, Kevin Ashton, in 1999. IoT is expected to offer sophisticated connectivity of devices, systems and services, support Machine-to-Machine (M2M) and cover a variety of protocols, domains, and application. And one of the highest hopes, IoT will continue to be directed in realizing automation systems in almost all fields along with a sophisticated technology called "Smart Grid".

ITU stated in ITU-T recommendation Y.2060 that the Internet of Things is a global infrastructure for the information society, enabling interconnection services between objects based on interopable information and communication technology. Things referred to in the Internet of Things are physical objects and information about objects that have the ability to be identified integrated into the communication network. The physical object in question is the world of objects that have sensors, are actual and connected. Examples are industrial robots and electronic equipment. While virtual objects in the form of multimedia content or application software is a world of information that can be stored, processed and accessed.

The IoT Agenda states "Systems of interconnected computing devices, mechanical and digital machines, objects, animals or people equipped with unique identifiers (UID) and the ability to transfer data through networks without requiring human-human interaction for human-computer interaction".

According to Techopedia IoT is "The concept of computing that illustrates the idea of everyday physical objects that are connected to the internet and are able to identify themselves to other devices". And CISCO provides the definition that IoT "Unites people, processes, data and things to make network connections more relevant and valuable than ever before, transforming information into actions that create new capabilities, richer experiences and unprecedented economic opportunities for business, individuals and countries. "

Internet of Things applications can be based on application platforms but can be built based on applications or services that can or already support platforms, based on

or services that can or already support platforms, based on capabilities such as authentication, device management, charging and accounting. Communication networks transfer data capture based on device to application or between devices. The communication network must build capabilities such as reliable and efficient data transfer.

SAP (Systeme, Anwendungen und Produkte) defines it as follows: The world in which physical objects are integrated into the information network on an ongoing basis, and where physical objects play an active role in business processes. The services available interact with 'smart objects' through the Internet, searching for and changing their status according to every information associated, while paying attention to privacy and security issues.

ETP EPOSS defines it as a network formed by things or objects that have an identity, in the virtual world that operates in that space by using intelligence interfaces to connect and communicate with users, social contexts and the environment.

Of the many definitions, a general definition can be made about the term Internet of Thing. Internet of Thing can be interpreted as IoT is a service interaction between digital objects or sensors that have the ability to transfer data or information through the internet network without human interaction (M2M) anytime, anywhere and with anything using a variety of intelligent application services to meet individual needs, industry and government.

II. METHOD

This study was conducted through literature studies both market analysis and economic analysis, benchmark analysis and regulation Analysis.

A. Regulation Analysis

ITU stated in ITU-T recommendation Y.2060 that the Internet of Things is a global infrastructure for the information society, enabling interconnection services between objects based on interopable information and communication technology. Things referred to in the Internet of Things are physical objects and information about objects that have the ability to be identified integrated into the communication network. The physical object in question is the world of objects that have sensors, are actual and connected. Examples are industrial robots and electronic equipment. While virtual objects in the form of multimedia content or application software is a world of information that can be stored, processed and accessed.
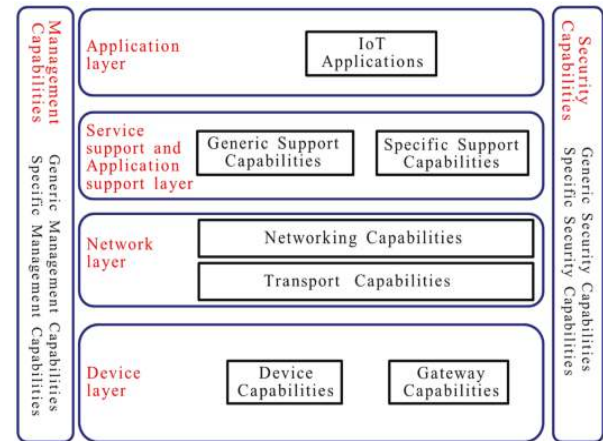

Figure 1. Internet of Things Reference Model

The IoT business perspective has evolved and is divided into two trends namely IoT as a platform technology turned into a business ecosystem, and a change in focus in making business models become the focus of designing business model ecosystems. The business model ecosystem is composed of value pillars that can help companies in designing and creating value. The following are the actors in a business ecosystem.

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The IoT ecosystem is composed of a variety of business players. Each business player plays at least one business role, but more roles are possible. The identified IoT business roles are shown in figure 2
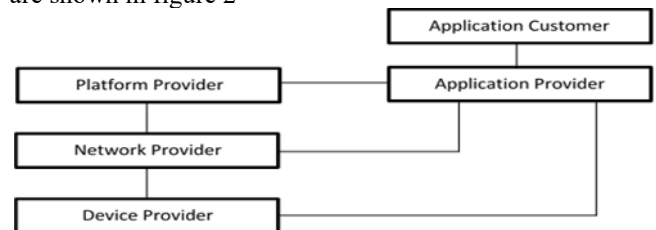

Figure 2. IoT Ecosystem

B. Market Analysis

The IoT ecosystem is extremely complicated, fragmented, and evolving. Due to the many differences in various sectors of the IoT ecosystem (e.g., health, public, transportation, industrial, energy), the sectors appear to embrace Internet technology differently - in silos (refer to Figure 3). However, the market forces keeping the silos defined are due in part to the technical requirements unique to the usages and applications that drive the internal market cohesion. Brownfield solutions may have benefitted from proprietary or vertically integrated solutions, aided by these cohesive market forces, long replacement cycles, and costly specialized hardware components. But that is unlikely to persist as IoT innovations continue to find technological adjacencies that spill over silo barriers causes technological

disruptive innovation. Generally, this is a good thing. However, these disruptive forces breaking down the proprietary silos also bring new challenges that impact security in the form of increased complexity, new business models and unanticipated interactions.
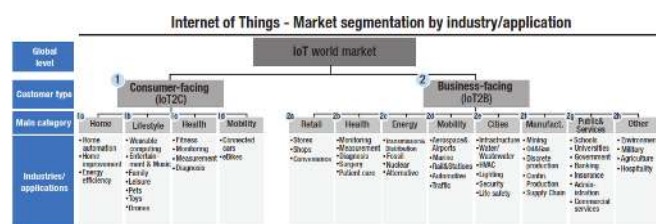

Figure 3. IoT Market Segmentation by Industry

IoT Analytics: The global market for the Internet of Things is expected to grow 37% from 2017 to $ 151 billion in 2018, based on a forecast (CAGR) of 39%, then predicted $ 1.567 trillion at 2025. The IoT market share in Indonesia is predicted to reach Rp 444 trillion in 2022, with more than 400 million sensor devices installed. Main contributions: Applications (43%), Platforms (35%), Devices (13%), Network (9%)
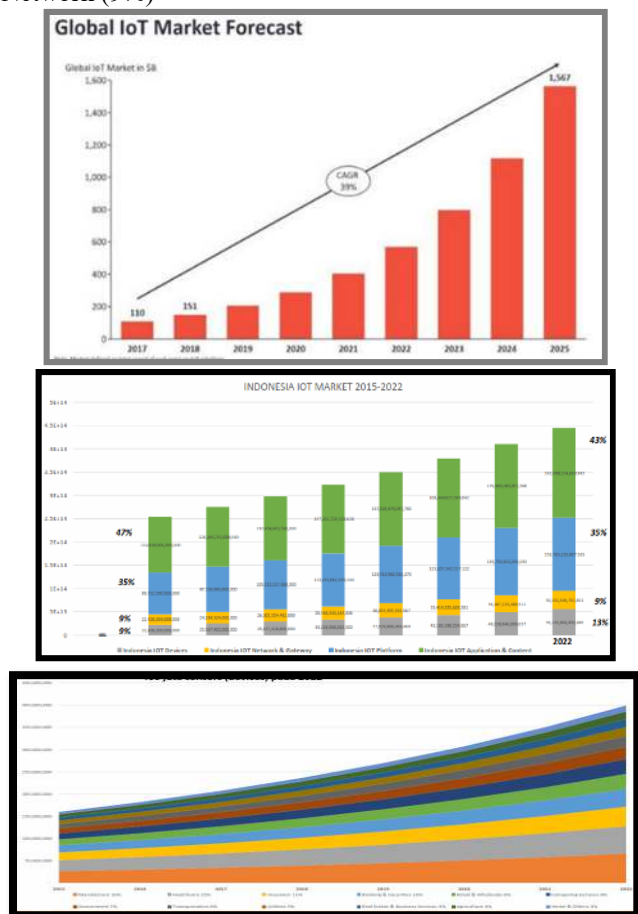

Figure 4. IoT Market Global VS Indonesia

C. Economic Analysis

The global economy is becoming more and more dependent on digital technologies, which nowadays are everywhere, permeating virtually all economic sectors and leveraging them. As of 2015, 75% of inhabitants in the OECD area have access to mobile wireless broadband, and up to 95% of businesses are connected to the Internet. Digital technologies are transforming value chains, business operations, relationship with customers, inter-sectorial relations... Because of this close relationship, we talk nowadays about digital economy. Multiple definitions of this term can be found. According to Accenture, it is "the share of total economic output derived from a number of broad "digital" inputs. These digital inputs include digital skills, digital equipment (hardware, software and communications equipment) and the intermediate digital goods and services used in production. According to Deloitte , digital economy is "the economic activity that results from billions of everyday online connections among people, businesses, devices, data, and processes. The backbone of the digital economy is hyperconnectivity which means growing interconnectedness of people, organisations, and machines that results from the Internet, mobile technology and the internet of things (IoT)."

Digitalization will increase Productivity by up to 400% (Malaysia) and up to 1000% (America). Indonesia is still behind the neighboring countries for IT sector expenditure per GDP in 10 sectors (Agriculture Industry-Manufacturing-Mining-Construction, Wholesales & Retail, Government, Transportation, IT & Business Services, Financial & Banking Services, Media & Communication, Health Services, Education and Services General Electric-Air-Gas). The 4 sectors are ranked most behind compared to neighboring countries: Industry, Wholesales & Retail, Government and Media & Communication. Impact of GDP Total Rp. 1700 Trillion in 2025 with the main drivers in the Manufacturing, Retail, Transportation, Mining, Agriculture & Telecom as well as Media sectors.

Improvement in digitization results in increased labor productivity.

Labor productivity, PPP, USD per worker

Asia and rest of world pioneers

Asia and rest of world peers

Relative score, rank

S-curve is based on polynomial regression.
Source: McKinsey analysis, IHS WIS 2015

Across 10 sectors, Indonesia IT spend lags behind even its peer countries.

Sector contribution in Indonesia, $ billion, 2015 — IT spend per GDP, %

Sector	$ billion	Bottom	Top
Industrials	436	Indonesia	Hong Kong
Wholesale and retail	117	Indonesia	United States
Government	48	Indonesia	United Kingdom
Transportation	37	Russia	United Kingdom
Business services	35	Russia	Malaysia
Financial services	31	China	United Kingdom
Media & Communication	23	Indonesia	United Kingdom
Healthcare	10	Russia	Malaysia
Education	7	Russia	Malaysia
Utilities	6	China	United Kingdom

Major sectors. Philippines data is not available. Including agriculture, mining, manufacturing, and construction. Agriculture IT spend is not available. IT-related activities and other business activities. Banking, securities, and insurances.
Source: McKinsey analysis based on data from Gartner IT Spending 2015 and IHS

Across key sectors, Indonesia could harness digitization to realize total productivity impact of $120 billion by 2025.

$ billion

Sector	Estimated 2025 GDP base impact	Operation optimization	Human health and productivity	Product and sales development
Manufacturing	34.4	29.4	3.0	2.0
Retail	24.5	12.5	6.7	5.3
Transport	15.5	13.6	1.9	0.0
Mining	14.8	14.0	0.5	0.3
Agriculture	11.0	10.6	0.3	0.0
Telecom and media	7.9	5.7	1.7	0.5
Healthcare	6.6	2.2	4.3	0.0
Public sector and utilities	4.8	4.7	0.1	0.0
Financial	1.8	1.1	0.1	0.6
Total	121.4	93.8	18.7	8.9

Source: Based on McKinsey Global Institute Study "Unlocking the potential of the Internet of Things", Team analysis adjusting figures for Indonesian context
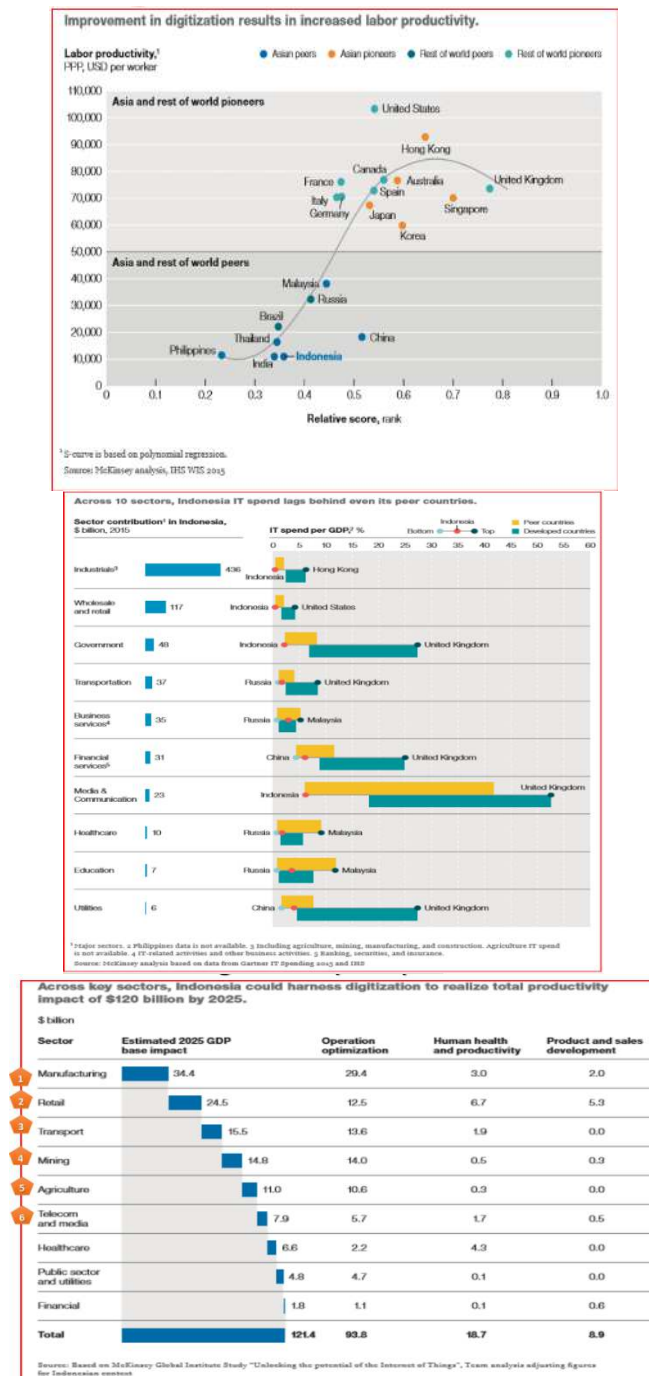
Figure 5. Digitalization increased GDP

Industry 4.0 cannot be separated from the role of IoT, the impact on the economy in Indonesia one of which is in the manufacturing sector. More than 25% of manufacturing contribution to GDP in 2030, increase of manufacturing contribution to GDP from ~ 16% to ~ 25% in 2030, real GDP increase from ~ 5% to 6 ~ 7% YoY between 2018-2030, increase in employment from +20 million to more than 30 million jobs in 2030.

D. Benchmark Analysis

Korea IoT strategy focus on platform layer, network layer, security layer, and ICBM (IoT, Cloud, Big Data, and Mobile Technology) converged services. In the service layer government though various pilot project were implemented,

they were not widely applied due to the burden of development and operational cost, industry it was mostly large businesses that introduced IoT, there was a low rate of IoT introduction by SMEs due the cost constraint, (Individual) Global business are competing with each other in the areas of wearable devices, home electronics and automobiles. SMEs are making efforts to make their way into the market of diverse areas of consumer product application. As platform, large of business in Korea are developing the platform, but they lack leadership in the global market, as SMEs in korea lack platform, it is difficult to them enter to the market, they are even likely to dependent on global businesses, global standarization is in progress based on one M2M. As network, technologies are being developed, which use software to process the rapidly increasing traffic in a flexible manner, ther is an increasing demand for non licensed low-power, long-distance band to interconnect object of remote areas, infrastructures such as 5G, giga-internet and Ipv6 are being developed and constructed to facilitate IoT. As Device, after the widespread take ip of smart phones, global companies are now competitively augmentef, intelligent, are converged devices, the market is forcasted to expand based on wearable devices and smart sensors. As security , as there are increasing case of security breaches in IoT services , technologies and services should be developed where functions for security pand privacy protection are installed form designing stage.

Brazil IoT strategy focus on Balanced view between innovation opportunities and economic impact, Vertical & Horizontal Approach potential adopted at local component. Competitive advantages. The four core verticals are Smart Cities, Healthcare, Agribusiness and Manufacturing. The priority verticals to be the focus of initial services focused on the population's quality of life and sustainable development through technology. Aimed at modernizing the provision of, public and private services, developing skills and entrepreneurship, as well as fostering innovation.

Malaysia IoT Strategy focus on Prepare IoT talent through a link with academia. In the quest to generate 100K IoT professionals (ors so-called the new generation – IoT) in the country, Favorit the latest IoT startup in malaysia partnetrd wih 15 Malaysian universities to review, refresh and include not only IoT elements in the curiculum and syllabus but also introduce a more practical method for university students to be familial in IoT middleware and how to create their first IoT application and project.

E. SWOT Analysis

SWOT (strengths, weaknesses, opportunities, and threats) analysis is a framework used to evaluate a company's competitive position and to develop strategic planning. SWOT analysis assesses internal and external factors, as well as current and future potential.

A SWOT analysis is designed to facilitate a realistic, fact-based, data-driven look at the strengths and weaknesses of an organization, its initiatives, or an industry. The organization needs to keep the analysis accurate by avoiding pre-conceived beliefs or gray areas and instead focusing on real-life contexts. Companies should use it as a guide and not necessarily as a prescription.

Strength	Weakness
• Startups are starting to develop in Indonesia • Academics who have been involved in IoT • The industry's attention towards IoT has begun to grow • Government awareness by building IoT with Leapfroging	• Product Development is still expensive • Inadequate infrastructure • Not all the stakeholders are aligned
Oportunity	**Threat**
• IoT is a technology that is not too mature • IoT technology can still be developed by startups • Indonesia is one of the largest IoT markets in the world	• Overseas IoT products that have entered Indonesia • The price of devices from outside is cheaper • The general public is more brand awareness

F. Recommendation

Overall, over the next ten years, more IoT value is likely to be created in advanced economies because of the higher value associated with each deployment. However, the potential number of IoT uses is likely to be higher in developing economies. The level of value in advanced and developing economies will vary depending on settings, industry, and application. The applications that drive the most value in developing economies differ from those in advanced economies and, in some cases, because there are no legacy technologies to displace, developing economies can "leapfrog" in IoT implementations. Nevertheless, we estimate that 62 percent of the potential annual economic impact of IoT applications in 2025 will be in advanced economies and that 38 percent will be in developing economies. The higher value in advanced economies reflects higher wage rates and costs, which raises the economic value of increased efficiency. As the values in developing economic markets rise, the economic impact associated with IoT will also grow.

The high volume of estimated installations in developing economies reflects the shift of global economic growth to those areas, which has important implications for companies that compete in IoT equipment and service markets. China will be one of the largest users of IoT systems in factories as well as in other settings. Countries with oil and gas operations—among the most important early adopters of IoT—will also be major geographic markets.

III. CONCLUSION

Indonesia is a developing country that needs to prepare itself to face industry 4.0 by utilizing IoT technology with leapfrogging methods. Leapfrogging Leapfrogging technology is a term used to describe the bypassing of technological stages that others (other countries) have gone through in the process of development and economic growth. Technological leapfrogging offers an opportunity for developing countries to catch up with modern ICT resources by skipping some of the intermediate technology stages. 'Leapfrogging' describes the idea that developing economies could find new paths to higher standards of living. Leapfrogging bypasses the mistakes and limitations of the slow route to development that other nations have had to take. Developing countries are not protected by obsolete technologies which most developed countries are reluctant to leave. Leapfrogging involves the technical aspects of implementing new technologies in the existing technological environments. Innovation is the cornerstone of leapfrogging - not just identifying new technologies but finding new ways to apply existing ideas. For the leapfrogging method to work, Indonesia needs to increase collaboration among players in the ecosystem, Promote open innovation, Develop and expand services targeted toward the first national need, Support research from universities (Reasearch, Labs testing)

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