Phenomenological Studies in Reforming Smart Buildings According to the Community Concept 5.0

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Abstract—Today, with the various problems faced by the world community, it requires everyone in various countries to develop technology and science to overcome various problems that are currently faced and predict future problems. Through innovation, the world's technological engineering is felt in the palm of the hand, even if only by means of a cell phone. This condition then inspired the Japanese Cabinet in 2016 to initiate society 5.0 or Society 5.0 through the Japanese Cabinet within the framework of the 5th Science and Technology Basic Plan. The big vision carried by the Japanese Cabinet in the 5th design and technology plan is to create a Super Intelligent Society (MSC). MSC is positioned as the fifth stage of development in the social structure of society, after previously the hunter / gatherer, agrarian, industrial, and information societies. In line with the development and innovation referred to above, the demand for services in the property sector, especially in building buildings, is getting higher. So that the concept of "Smart Building" or better known as Smart Building / Intelligent Building is created. This concept was born as a result of increasing human welfare and changes in modern life patterns that demand a level of service and management of the building environment, which greatly affects the welfare and services in the workplace, which in turn will affect productivity, morality and satisfaction. Therefore, efforts to adjust the current conditions between the speed of information technology development and the growth of a new generation of humans in this era which are almost linear / concurrent, as well as between society and building, are an effort that must be made so that technological and social developments can coincide. . This effort is what is meant by reformulation of Smart Buildings in the Concept of Society 5.0.

Keywords: smart building and reformulation; society 5.0

I. Introduction

Today with various problems faced by the world community, it requires everyone to continue in various countries to develop technology and science to overcome various problems faced today and predict future problems. Through innovation, the world's technological engineering is felt in the palm of the hand, even only through a mobile phone.

This condition then inspired the Japanese Cabinet in 2016 to initiate Society 5.0 or Society 5.0 through the Japanese Cabinet in a framework of the 5th Basic Plan of Science and Technology. The big vision carried by the Japanese Cabinet in planning this 5th science and technology is to create a Super Intelligent Society (MSC). MSC is positioned as the fifth stage of development in the social structure of society, after the hunter/gatherer, agrarian, industrial, and information societies.

The super intelligent society which was initiated by the Japanese cabinet has influenced

most of the world's people, including our country, in almost all aspects of life. Currently, in our country, various innovations and information technology are flourishing to provide convenience for humans in carrying out their daily lives, including in developing technology and innovation for the construction services sector.

In line with development and innovation, the demand for services in the property sector, especially in buildings, is getting higher. So that the concept of "Intelligent Building" or better known as the Smart Building / Intelligent Building was created. This concept was born as a result of increasing human welfare and changes in modern lifestyles that require a level of service and management of the building environment, which greatly affects the welfare and services in the workplace, which in turn will affect productivity, morality and satisfaction.

Therefore, efforts to adjust the current conditions between the speed of development of information technology and the growth of a new generation of humans in this era which is almost linear/simultaneously, as well as between society and building, is an effort that must be done so that technological and social developments can coincide. . This effort is what is meant by the reformulation of Smart Buildings in the Concept of Society 5.0.

Today's progress through innovation in science and technology is extraordinary, one of which is the dramatic increase in computing power. This contributes to the improvement of business and society. At the same time, the world faces global-scale challenges such as depletion of natural resources, global warming, growing economic inequality, and terrorism. We live in an age of uncertainty, with complexity growing at all levels. Therefore, it is very important for us to make maximum use of ICT in order to gain new knowledge and create new values in order to make connections between "people and things" and between "real world and cyberspace" effectively and efficiently in order to solve problems in society. , create a better life for the people, and maintain healthy economic growth. Addressing this challenge by encouraging multiple stakeholders at various levels to share a common vision of the future will be critical to realizing such a society through digitization.

Since 2016, an initiative called "Society 5.0" or "Society 5.0" was proposed by the Cabinet of Japan in its 5th Science and Technology Basic Plan, with a vision to create a "Super Intelligent Society" (MSC). MSC is positioned as the fifth stage of development in human society, after the hunter/gatherer, agrarian, industrial, and information societies as depicted in Figure 2. The MSC represents a sustainable society connected by digital technology that is present in detail with the various needs of that society. MSC provides necessary goods or services to people who need them when needed and in required quantities, thereby enabling

its citizens to live active and comfortable lives through high quality services regardless of age, gender, region, language, and so on. It should however be noted that digitization is only a means, and that we humans as the main actors remain important so that a strong focus is maintained on building communities that make us happy and give us a sense of value. The Japanese government presented its vision of Society 5.0, along with exhibitions by supporting companies from Japan, at CeBIT 2017, the European business festival for innovation and digitization covering the digitization of business, government and society from all angles.

The United Nations Sustainable Development Goals (SDGs) were adopted in September 2015 as a guide for the whole world. Its driving principle is to bring about peace and prosperity for all people and the planet by responding to challenges with inclusiveness that "leaves no one behind". The Japanese government has developed the Guiding Principles for the Implementation of the SDGs in the fields of science, technology, and innovation (STI) and provides recommendations which include:

• creating a global future through Society 5.0,

• enable solutions using global data,

• promote cooperation at the global level, and

• develop human resources to carry out STI efforts for the SDGs.

Society 5.0 is built on innovation across 12 service platforms that take full advantage of the Internet of Things (IoT): big data, computing, artificial intelligence (AI), and robotics technology. A series of government initiatives are now underway in Japan, including the "Robot Industry" and "Connected Industries," introduced by the Ministry of Economy, Trade and Industry (METI); and the "Conference Towards an AI Network Society" introduced by the Ministry of Home Affairs and Communications (MIC). These initiatives basically target the development of common platform technologies, services and systems, and systems systems for the creation of new markets and transformation into a prosperous society by creating new values through cyber physical systems (CPS).

CPS shows various big data items collected from low power intelligent sensing devices and networks then stored in information storage devices. It can then be analyzed and visualized using analytical tools such as AI with high computing power in cyberspace. This valuable data, often difficult for humans to pay attention to themselves, will be the input for actions taken by decision makers to provide solutions to social problems and economic growth in the physical world. In Japan, a series of government projects, such as ImPACT (Impulsing Change Paradigm Change through Disruptive Technologies Program) and SIP (cross-ministerial Strategic Innovation Promotion

program), are aimed at realizing these technologies and service platforms.

ImPACT is designed to develop industry and society through high risk and impact research and development, while SIP covers the entire path from basic research to effective exit strategies (practical application / commercialization) as well as taking initiatives to reform regulations and systems. In SIP, for example, projects such as automated driving systems; energy carrier; cybersecurity for critical infrastructure; and technologies to create next-generation agriculture, forestry, and fisheries are now underway with a budget allocated from the Council for Science, Technology, and Innovation (CSTI), which is responsible for planning and coordinating IMS policies under the Cabinet of Japan.

Society 5.0 in its sustainability process will achieve a high level of convergence between virtual space (virtual space) and physical space (real space). In the information society, in the past (Society 4.0), people would access cloud services (databases) in cyberspace via the Internet and search, retrieve, and analyze information or data. In Society 5.0, a large amount of information from sensors in physical space is accumulated in cyberspace. In cyberspace, this big data is analyzed with artificial intelligence (AI), and the results of the analysis are fed back to humans in physical space in various forms.

In the information society of the past, the common practice was to collect information through networks and analyze it by humans. However, in Society 5.0, people, objects and systems are all connected in cyberspace and the optimal results that AI obtains beyond human capabilities are fed back into the physical space. It is this process that brings new value to industry and society in ways that were previously impossible.

I. Literature Review

Smart Building

The word "smart" was first used in the United States in the early 1980s to describe a smart building. Along with the development of information technology, and the increasing demand for services from building owners and users for the comfort and safety of the environment, thus creating a concept concerning "Smart Buildings" or better known as Smart Buildings/Intelligent Buildings. This concept was born as a result of increasing human welfare and changes in modern lifestyles that demand the level of service and management of the building environment, which greatly affects the welfare and service in the workplace, which in turn will affect productivity, morality and satisfaction. So, to meet these demands, there needs to be a smart building that can create a multidisciplinary effort to integrate and optimize building structures, service systems, management, and a comfortable, safe and cost-effective environment. [J.K.W. Wong, H. Li, &

S.W. Wang, 2005; Intelligent Building Research]

Smart buildings can be defined systematically that an intelligent building must have information and control services to meet the needs and convenience of users. Smart buildings have software specifically designed as controllers, and hardware in the form of electronic circuits installed on the main building structure, and can manipulate telecommunications and automation functions to meet the needs of the facilities required by the users. The study of intelligent building automation systems has become a common topic all over the world. Furthermore, that this will be a new challenge for building designers or architects in designing a smart, efficient and integrated building in the building structure, including its mechanical and electrical (ME) system. The end result of a design, users will get the benefits of energy savings. Furthermore, an intelligent building that has an automatic control system, where building owners and users can enjoy financial benefits and can improve the quality of service and management. To meet the above, a smart building must meet three main requirements [Ler, Eng Loo, 2006; Intelligent Building Automation System], namely:

1. The building must have the latest automation system to monitor various necessary facilities, such as air conditioning, ventilation, lighting, fire safety and so on, so as to create a comfortable and safe environment for users;

2. The building must have a good network infrastructure between the floors of the building, so that the data flow can be flowed smoothly;

3. The building must provide adequate telecommunications facilities.

The basic concept of an intelligent building, namely sustainable design, must pay attention to social, technological and environmental elements by synergistically integrating several sub-systems in buildings, such as: Building Automation Systems, HVAC Systems, Lighting Systems, Transportation Systems, Systems Fire Prevention, Security Systems, Communication Systems and Energy Saving Systems. With the sustainable design, it is expected to provide convenience in moving places for residents, users, providing building support facilities and infrastructure in the form of equipment and equipment in buildings, as well as providing facilities and infrastructure that can support all activities in the information system.

The concept of smart building is based on several influencing factors, such as: Tight competition in the business world greatly affects the completeness of building facilities that can simplify, expedite, and accelerate all activities that occur in a building; There are demands from building users for the ease of processing information, security and safety services for users; and There are demands from building users for the convenience and facilities in a building to facilitate all activities *[Hakim, 2010; Evaluasi Sistem Bangunan Pintar*

Pada Pusat Perbelanjaan Senayan City di Jakarta].

The Smart Building concept that is integrated in a synergistic and integrated manner that can support the Green Building System as a way to save energy, save operational costs and facilitate building management including maintenance, as shown in the image below:
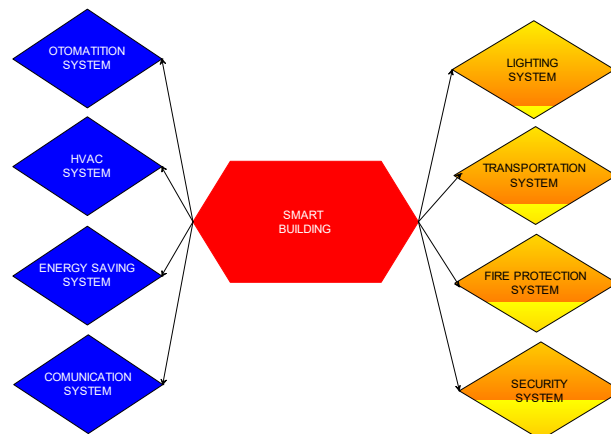

Figure 1. Integrasi Intelegent Building System
(Source: Evaluasi Sistem Bangunan Pintar, Hakim, 2010)[5]

Phenomenological Approach

Literally, phenomenology comes from the Greek word "*pahinomenon*" which means symptoms or everything that appears. The term phenomenon can be seen from two points of view, namely the phenomenon that always points out and the phenomenon from the point of view of our consciousness. Therefore, in looking at a phenomenon we must first look at the filter or ratio, so as to find true consciousness.

The early history of the emergence of the philosophy of phenomenology developed in the 15th and 16th centuries. At that time, there was a big change in man about his perspective in this world. In the previous century, humans always looked at things from the perspective of God. Furthermore, there was a big wave of modernity at that time which changed the point of view of that thought. Many philosophers rejected the doctrines of the Church and carried out a reform movement known as the Enlightenment.

This paradigm arises because of the emergence of human thinking on subjectivity. What is meant by subjectivity here is not an antonym of the word objectivity. The subject in question is the meaning of "I" which is in humans who will, act, and understand. According to Suseno as quoted by Mujib (2015) humans come into the world as subjects who have self-awareness, not only present as objects in this world, but also as subjects who think, reflect, and act critically and freely.

This phenomenology comes from the philosophy that surrounds human consciousness which was initiated by Edmund Husserl (1859-1938) a German philosopher. Initially this theory was used in the social sciences. According to Husserl, there are several definitions of phenomenology, namely: (1) subjective or phenomenological experience, and (2) a study of consciousness from the main perspective of a person. This theory is the result of resistance to previous theories that view something from the divine paradigm. So simply, phenomenology is defined as a study that seeks to analyze descriptively and introspectively about all awareness of the human form and its experiences both in the sensory, conceptual, moral, aesthetic, and religious aspects. Furthermore, Martin Heidegger argues about Husserl's phenomenology (in Mujib: 2015) that humans cannot have "consciousness" if there is no "field of consciousness", namely a place, panorama or world so that "awareness" can occur in it which leads to existence. worldly.

Phenomenology is an approach started by Edmund Husserl and developed by Martin Heidegger to understand or study the experience of human life. This approach evolved a mature and mature qualitative research method over the decades of the twentieth century. The general focus of this research is to examine/examine the essence or structure of experience into human consciousness (Tuffour: 2017).

The definition of phenomenology is also expressed by several experts and researchers in their studies. According to Alase (2017) phenomenology is a qualitative methodology that allows researchers to apply and apply their subjectivity and interpersonal skills in the exploratory research process. Second, the definition put forward by Creswell quoted by Eddles-Hirsch (2015) which states that qualitative research is a study that is interested in analyzing and describing the experience of an individual phenomenon in the everyday world. For example, the phenomenological study of anorexia for some people is happening today. Anorexia is an eating disorder (if you can say that) that a person experiences because of the fear of gaining weight

caused by lifestyle and the demands of popular culture. This study can be emphasized on the condition of why someone wants to be like this and interpret their life based on the point of view they understand. This study aims to understand and describe a specific, profound phenomenon and obtain the essence of the participants' life experiences in a phenomenon (Yuksel and Yidirim: 2015).

III.Method

The method used in this study is the phenomenological method, in which researchers seek to understand how humans construct meanings and important concepts within the framework of intersubjectivity (our understanding of the world is shaped by our relationships with other people).

The phenomena studied are:

• Transcendental phenomenology is something that goes beyond everyday life to a pure ego where everything is understood freshly, as if for the first time.

• Existential Phenomenology, namely the essence of consciousness and activity, is important in the development of science.

• Negative phenpomenology reflecting pre-reflective consciousness (consciousness of objects) or creating thematic awareness of unconscious ones

The aim of this research is :

• Reducing individual experience of a phenomenon into a description that explains the universal essence of the phenomenon.

• Phenomenologists seek to "understand the essence of a phenomenon".

• Studying human phenomena without questioning their causes, actual reality, and appearance.

IV.Results and Discussion

Current Phenomenon

Witnessing the current symptoms/phenomena, we are in an era called the industrial revolution 4.0, and society 5.0. A condition that forces everyone to be able to follow this phenomenon if they do not want to be left behind, this era is then called the disruptive era. This is a technological and scientific innovation that is developing very rapidly, so that it can help create new markets. On the other hand, this innovation is also capable of disrupting or even damaging existing markets and even more powerfully capable of replacing existing technologies.

The phenomenon of industrial revolution 4.0 and society 5.0 in our country in the last two years has shown a significant increase, which is shown by the very rapid development of the start-up industry.

The group of young people today is an age group that is truly a total user and production of new information technology. The rapid development of information technology at this time seems to occur automatically in all fields, therefore society is required to be able to make breakthroughs and new approaches that incorporate real, fundamental digital technology, because the essence of the industrial revolution is to make fundamental changes, especially changes in the way of think.

That currently our country has not been able to implement the 4.0 industrial revolution, but that does not mean that this revolution is stagnant, in fact it continues to grow very rapidly, especially in 5 industrial fields such as food and beverages, textiles, automotive, electronics and chemicals. These five industries have had a significant impact at this time, especially when the world is being hit by the COVID-19 pandemic, which has forced people to work from home through information technology.

Worries about the presence of the industrial revolution 4.0, which is considered to have the potential to degrade the role of humans, actually made Japan give birth to a concept, namely Society 5.0. A concept by increasing artificial intelligence to be able to transform all data and information in all areas of human life which in turn will open up new opportunities for humans.

Era Society 5.0

The Japanese state then gave birth to the concept of Society 5.0, which is defined as a human-centered society that balances economic progress with solving social problems through a system that strongly integrates virtual space and physical space. The Japanese way of describing Society 5.0 is as follows: (1) the significance of technological development, but the role of society is a consideration for the occurrence of the industrial revolution 4.0, (2) Society 5.0 offers a human-centered society, (3) Society 5.0 Balances Economic Progress with Problem Solving Social Through a Highly Connecting System Through the Virtual World and the Real World, (4) Society 5.0 is no longer capital, but data that connects and drives everything, (5) helps fill the gap between the rich and the disadvantaged, (6) Medical services and education, from elementary to tertiary level will reach small villages.

Furthermore, the significant difference between the era of the industrial revolution 4.0 and society 5.0 is as follows: the industrial revolution 4.0 demands connectivity in all things using the internet of things. While the concept of the era of society 5.0 as a new innovation from society 1.0 to society 5.0 in the history of human civilization. Where this era focuses on the human component, while still using artificial intelligence as a tool/media. The internet is not only for information but for living life, in the era of society 5.0 it is also referred to as an era where all technology is part of humans themselves. Technological developments

can minimize the gap in human and economic problems in the future, where this era offers a society centered on balance.

Society Implementation

The realization of Society 5.0 aims to create a society that can solve various social challenges by incorporating the innovations of the industrial revolution 4.0 (eg IoT, big data, artificial intelligence (AI), robotics, and sharing economy) into every industry and social life.

By doing so, the society of tomorrow will be one in which new values and services are created constantly, making people's lives more harmonious and sustainable. This is Society 5.0, a super smart society. Japan will take the lead to make this happen ahead of the rest of the world. "Society 5.0" is presented as a core concept in the 5th Basic Plan of Science and Technology. (see picture 1)

The historical journey towards society 5.0, starting from society 1.0, where society 1.0 is defined as a hunter-gatherer, stage of human development, we have now passed the agrarian and industrial stages, Society 2.0 and 3.0, and are moving beyond the information age, Society 4.0. Entering society

5.0 where Big Data collected based on the internet will be converted into a new type of intelligence by artificial intelligence and will reach every corner of society.

When we move to Society 5.0, everyone's life will be more comfortable and sustainable because people are only provided with products and services in the quantities and times that are needed.

Japan has the advantage of implementing Society 5.0. With the abundance of real data through big data, further combined with the cultivation of technology from monozukuri, Japan takes advantage of these unique factors, Japan will overcome social challenges such as declining working age population, aging of local communities and energy and environmental problems ahead of other countries . Japan will realize a dynamic economic society by increasing productivity and creating new markets. By doing this, Japan will play a key role in extending the new Society 5.0 model to the world.

The concept of society 5.0 exists to be able to solve the problems of society throughout the world, where economic capitalism, economic growth and technological development have not been able to create a society that can grow and develop independently and can enjoy life to the fullest, therefore the concept of society 5.0 is the answer to the problem. with the aim of justice, equity, shared prosperity so as to create a supersmart society. Some of the advantages of implementing society 5.0 are as follows:

a. Healthcare Provider

By connecting and sharing medical data now

spread across hospitals, effective data-driven medical care will be provided. Remote medical care allows the elderly to no longer need to frequent the hospital. In addition, you can measure and manage health data such as heart rate at home, making it possible to extend the life expectancy of healthy people.

b. Mobility

People in under-populated areas find it difficult to shop and visit hospitals due to the lack of public transportation.

However, autonomous vehicles will enable them to travel more easily reducing time and costs while ensuring security in global business transactions.

Application to Smart Building

1. The building must have the latest automation system to monitor various necessary facilities, such as air conditioning, ventilation, lighting, fire safety and so on, so as to create a comfortable and safe environment for users;

2. The building must have a good network infrastructure between the floors of the building, so that the data flow can be flowed smoothly;

3. The building must provide adequate telecommunications facilities.

4. The concept of a building designed to allow parts of the structure to move, without compromising the overall integrity of the structure.

V. Conclusion

Society 5.o is a mirror of the face of the world community in the future where the demands of the development of information technology force humans to live intelligently with various digital technologies.

Reformulation of Smart Buildings in the Concept of Society 5.0 is an effort to adjust the current conditions between the speed of development of information technology and the growth of the new generation of humans in this era, almost simultaneously, as well as between society and building.

Architecture kinetics is one of the platforms that can be used as an effort to reform smart buildings.

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