The Strategies for Building a New Innovation Ecosystem to Create a Virtuous Cycle Structure between the Hyper-Competitive Environment and the Social Economic Sector in the 21st Century

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***Abstract*—In this paper, I examined the technological environment change in the 21st century and the strategies of building a new innovation ecosystem. Future disruptive technology innovation is expected to change the new external environment and the environment of hyper-competitive environment will continue. Under such circumstances, large corporations need to be transformed and innovated, and promising start-up ventures are expected to grow rapidly with new innovations. In addition to this hyper-competitive environment sector, social enterprises in the social economy sector will be expanded. In this paper, I studied new strategy of innovation ecosystem construction in the situation where such rapid change is expected. The strategies of creating a virtuous cycle structure in hyper-competitive environment sector and a social economy sector can be largely considered in the following three dimensions. First, it examines the virtuous cycle structure between the hyper-competitive environment sector and the social economic sector through future studies, so called, foresight. The second is to establish a cooperative ecosystem within the innovation cluster between large enterprises and SMEs in the area of hyper-competitive environment sector. Third, the social economic ecosystem connected with this hyper-competitive environment sector is to be built around social enterprises..**

***Index Terms*—Innovation ecosystem, hyper-competitive environment, social economy sector, social enterprise.**

I. Introduction

The radical development of science and technology, now called the Fourth Industrial Revolution, is making dramatic changes in society as a whole [1]. In fact, there is a rapid growth of venture businesses and innovation in large companies competing with these technologies [2]-[4]. In addition to these private sector companies, social enterprises that cause social innovation through the application of these technologies to society as a whole have also become major innovators. In this paper, the transition to the knowledge society based on these advanced technologies will be discussed in terms of the birth and growth of new companies. It also examines social innovation and social enterprise through application of existing technology to society. New promising technologies will continue to emerge in the future, and companies will pursue change and innovation to preemptively respond to these technological changes [2]-[4].

Companies that adapt to these changes in the external environment will survive, and maladaptive firms will decline [2]-[4]. In addition, not only the survival of the enterprise itself but also the contribution to society should be pursued. In the current knowledge society, the roles of companies that are different from the past era of mass production consumption are required. In this paper, we examine the technological environment change in the 21st century and the strategy of building a new innovation ecosystem. In other words, the next section looks at the strategy of creating a virtuous circle structure between the hyper-competitive environment area and the social economic sector.

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II. Entry into Knowledge Society in the 21st Century

All sectors of society are now entering the Knowledge Society as a technology base [5]. With the rapid development of advanced technologies such as IT, BT and NT technology, the society is entering a new society in which infrastructure, organization and operation methods are changing drastically. IT, BT, NT technology, and each technology are merged, all technologies are developing together [2]-[4]. Since the major drivers of social change are largely caused by science and technology, the paper deals with the entry of knowledge society based on science and technology as a major issue. The paradigm of the knowledge society deals with environments that are fundamentally different from the past simple farming society or mass production age. Since general workers are knowledge workers armed with knowledge, it is possible to predict the development of knowledge society through participation, networking, and related research [5], [6]. In this paper, we examine the knowledge society first and examine the acceleration of technology change that is a driver of the knowledge society.

III. The Emergence of New High-tech and Key Cases

After the agricultural revolution in the past, the industrial revolution has led to the explosive growth of capitalism in the era of mass production [2]-[4]. Through the era of mass production, the so-called Fordim, the appearance and management techniques of large organizations have begun to develop highly, and capitalism has begun to develop. And now IT, BT and NT revolution are underway. Prior to the Industrial Revolution In the medieval ages centered on agricultural technology, the spirit of knight was considered important. Entrepreneurship, which leads new technological innovations and leads to social change is an important issue in the 21st century [2]-[4]. In Don Quixote, which depicts the

adventure of the medieval period, Don Quixote falls into his imagination and has many adventures in the spirit of knight. Steve Jobs, who has sparked a smart revolution at the moment, has been able to transform social change through the pioneering entrepreneurial spirit of reorganizing new technologies and continually launching innovative products that are essentially different from existing products. This entrepreneurial spirit will become even more important with the continued emergence and development of promising technologies in the 21st century [2]-[4]. A variety of promising technologies are appearing at the moment of the technological revolution. New promising technologies such as smart grids, vertical farm (plant factories), ubiquitous health, drones, virtual reality, and big data have emerged in the past, and it is anticipated that these technologies will be transformed into corporate organizational change and social change. Among these promising technologies, I will examine smart grid, vertical farm(plant factories), and ubiquitous health that I studied.

A. Smart Grids

Smart grids are referred to as intelligent power grids.[1] In the past, if electricity was a unilateral power transmission system for power generation, transmission, and distribution, a smart grid would be able to exchange information between utilities and customers using two-way power and IT technology. In the smart grid system, smart household appliances actively react and operate in response to changes in electric power demand, and are linked to smart transportation and smart renewable energy devices. Major technologies include Smart Place, Smart Operating System, Smart Transportation, and Smart Renewable Energy.

B. Vertical Farm

Plant factories are sometimes referred to as vertical farms because they are based on buildings and equipment.[2] It can be applied to traditional agriculture by utilizing cutting-edge IT, BT and NT technology, and it is a technology that can make existing agriculture in the city and dramatically increase the production. It is a technology that farms through an a plant movement device, and an air supply facility and LED device considering the wavelength necessary for plant growth in an urban building.

C. Digital Healthcare

Digital health care is not an integrated health care system that responds to a past epidemic, but an integrated health management system that can always manage disease related information before the onset of a disease.[3] IT, and BT technologies to preemptively predict diseases, collect information, and manage them in an integrated manner. Ubiquitous health technology is expected to further develop due to the complete detoxification of the human genome map and the rapid development of hospital IT technology.

[1] http://www.ksga.org/main/main.asp
http://home.kepco.co.kr/kepco/EN/main.do
[2] http://www.verticalfarm.com/
[3] http://forumonhealthcareinnovation.org/

IV. 21st Century Environmental Change and Innovation Mechanism

A. Overall organizational and Social Change

Changes in organization and society are taking place through the appearance of these advanced technologies. These changes can be considered in three dimensions.

First, entrepreneurs with entrepreneurial spirit recognize the upcoming changes in society through the appearance of promising high technology and create a new organization based on technology through entrepreneurship [2]-[4]. By recognizing this unstable world of technology, and trying to commercialize and organize it, capitalism can maintain its dynamism and grow continuously.

Second, change and innovation of existing large organizations. Along with the appearance of promising high-tech, existing big organizations have become more important as the importance of change and innovation. As the external environment changes in a very short period of time through the continuous emergence of new promising technologies, corporate change and innovation have emerged as the most important issues.

Third, as smart infrastructure of advanced technology is accelerated, the whole society is becoming smarter. Nowadays, we have reached the age of Web 2.0, which is beyond passive browsing of the Internet, communicating with consumers and interacting with consumers and reproducing information. Future market forecasts and social intelligence will be accelerated through big data analysis in the future. In addition, as the service sector continues to increase due to the continuous appearance of high-tech, the services that apply these advanced technologies to the social part will be further increased.

B. The Emergence and Rapid Growth of Technology Venture Companies

Business ecosystems are changing as new companies continue to emerge with the advent of these advanced technologies. Traditional powerhouses that have dominated the industry have fallen in a moment and new entrepreneurs are growing in a short period of time [2]-[4]. In the past, Nokia has innovated in the wood industry and has grown into the world's largest mobile phone company, but with the appearance of smartphones, it has fallen down the road. In addition, Kodak, which was a leader in the field of film, also fell down with the advent of digital cameras. It failed to adapt to the new environmental change, digital technology, and fell to the old success formula.

On the other hand, there are cases of rapid growth through entrepreneurship in a new environment. Facebook, founded by Mike Zuckerberger in his twenties, grew quickly as a global company based on the SNS platform. China's Marwin's Alibaba has grown rapidly as a company that competes with Amazon through shopping malls. In China, too, Xiao Mei and Huawei rapidly grew into low-priced smart phones against high-priced Samsung phones in the smartphone era. These companies have grown in the past as low-priced products, but they are currently playing low-priced, high-quality products. DJI in China has quickly grown into the world's largest and

largest drones manufacturer. [4] DJI Drones has a great significance in that the Chinese products, which were recognized as imitations of the past, now appear as world-class products.

C. Changes and Innovations of Existing Giant Enterprises

New entrepreneurs are growing by catching up with the emergence of promising technologies and new opportunities. At the same time, existing companies are pursuing continuous change and innovation in order to adapt to the new environment [2]-[4].

In addition to the radical development of science and technology, the external environment of the company is rapidly changing in a short period of time. IT, BT and NT technologies are expected to continue to develop in the future [2]-[4]. In the future, the nano industry is expected to see explosive growth of the industry after 2025. In addition, related IT, BT and NT fusion technologies are expected to emerge. With the development of these technologies, it is expected that the external environment of the company will continue to change. To survive in this environment, companies are required to make continuous changes and innovations. This should not be a gradual change in response to the external environment, but rather a way to reorganize the existing business structure. In other words, it is important to forecast the discontinuous change of the external environment on a proactive basis, and a company that can innovate will survive [5], [6]. Technology management capacity is the ability to detect change in external technology and drive change and innovation [2]-[4]. Technology management is a systematic technology management capability that senses and responds to internal and external technologies [2]-[4]. In other words, technology management should detect and react not only technology inside company but also technology change outside company. The company should respond to the external environment by promoting the change and innovation of the whole company, focusing on such technology management [2]-[4].

D. Social Innovation and Creation of New Value

At present, many companies are fiercely competing with high technology. Only in the technology war, victory guarantees the profit of the enterprise. Companies that are the subject of this value creation possess huge capital and the concentration of wealth is intensified by these companies. As an alternative to the limitations of capitalism and the concentration of wealth, the current shared economy and social economy are being discussed [7]. Alternative capitalism is being discussed through the sharing of capitalism and social economy. The social economy is dominated by social enterprises, cooperatives, etc [7]. Social enterprises, and cooperatives lead to changes in society through the utilization of existing technologies, ie, appropriate technology, in the areas of social needs. Social change through the utilization of appropriate technology is called social innovation [8]. Social innovation leads to innovations through related technologies in the fields of welfare, medical care, and social sectors, and to change and innovation in society [8]. In addition to these social enterprises and social innovations by cooperatives, social innovation can be promoted as part of the social contribution of large corporations [7], [9]. Global companies such as GE and P & G are making various social contributions to underdeveloped countries such as Africa. Many of Korea 's big businesses are also pursuing social innovation that is connected with the change of society with the technical capability of the company. The expansion of existing technologies into the social sector can be promoted by social innovation through social contribution by social enterprises, cooperatives and existing large corporations [7], [9].

V. The Strategies of Building a New Innovation Ecosystem to Create a Virtuous Cycle Structure between the Hyper-Competitive Enterprise and the Social Economic Sector

Strategies for creating a virtuous cycle between the hyper-competitive enterprise and the social economic sector can be largely considered in the following three dimensions. Also, the virtuous circle structure can be seen in the following Fig. 1. First, it examines the virtuous cycle structure between the hyper-competitive environment sector and the social economic sector through future studies, so called, foresight. The second is to establish a cooperative ecosystem within the innovation cluster between large enterprises and SMEs in the area of hyper-competitive environment sector. Third, the social economic ecosystem connected with this hyper-competitive environment sector is to be built around social enterprises.

The details of this strategy are as follows;

First, it is necessary to examine the future of the virtuous cycle structure based on open innovation between the hyper-competitive environment sector and the social economic sector through the future studies, so called, foresight. The foresight can be described as a drawing of the future through planning, networking, and future research [5], [6]. The basis for cooperation between these hypercompetitive and social economic sectors can be built on open innovation platforms. Large enterprises and SMEs can exchange technologies, resources and competencies based on open innovation [10]-[13]. In the past, closed large corporations became able to actively cooperate with venture companies through the introduction of open innovation, and venture companies have had a great influence on the innovation of large corporations based on independent innovation [10]-[13]. Large corporations can make new social contributions based on their technology resources and capabilities. In addition, SMEs influence social innovation through the development of social innovation technologies. It is necessary to look into the future that cooperates based on the open innovation platform between hypercompetitive and social economic sectors.

Second, there is a need for a new innovation cluster strategy to cooperate with large companies and small and medium venture companies.

Innovation cluster is an aggregate of small and medium venture companies, universities, research institutes,

[4] http://www.dji.com/company

technology finance, technology consulting, and other enterprise support organizations [14], [15]. In such an innovation cluster, new entrepreneurs are continuously established, and cooperating with universities and research institutes, the entrepreneurial enterprises grow gradually [14], [15]. Silicon Valley, Research Triangle Park in USA, Daedeok Innopolis and Pangyo TechnoValley in Korea are concrete examples of innovative clutter. In order to establish a new innovation ecosystem due to technological changes in the 21st century, it is necessary to establish a new cooperation platform based on open innovation that emphasizes the cooperation of SMEs of large enterprises [12]-[15]. Therefore, innovation clustering strategy is needed to cooperate with big companies and small and medium venture companies as well as venture company support policies to create new innovation. To this end, it is necessary to operate various support programs such as technical cooperation, human resource exchange, human resource development, technology consulting, etc. between large and small venture companies to support open innovation.

Third, social economic ecosystem based on new cooperation should be built leading social innovation centered on social enterprises. In order to foster social enterprises, customized support should be promoted according to the stage of social enterprise development [9]. In addition, a variety of support systems for technology-based social enterprises can lead social innovation [9]. Various support measures should be set up so that social economy, such as social enterprises, cooperatives, and village enterprises, which are the subject of social economy, can be established. In addition, large corporations / SMEs should be able to build social economy through various cooperation with these social enterprises [7], [9].

In other words, it is necessary to seek various programs and win-win cooperation schemes that can create new social innovations through cooperation with the respective sectors, rather than merely cooperating with each other in their own domains.

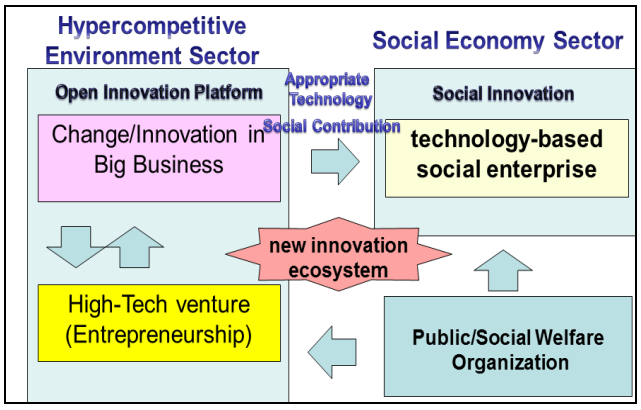

Fig. 1. The strategies for building a new innovation ecosystem to create a virtuous cycle structure between the hyper-competitive environment and the social economic sector in the 21st Century.

VI. Conclusion

Future technological innovation will continue to be the most important issue in corporate management and social change. Companies are experiencing intrinsic environmental changes that they have not experienced in the past, and these changes are just the beginning [16]. It is expected that there will be continuous change of business management environment by various promising technologies such as smart grid, plant factory, virtual reality, ubiquitous health, drone, wearable computer. It is expected that the technological advancement in all areas of society will be accompanied by new changes in business management [2]-[4]. Now, for a company to survive, only a company that is ahead of its competitors in forecasting management will be able to grow. In addition to winning the competition in existing markets, companies that cooperate with the social economy sector, which is a new and growing economic region, will enjoy continuous competitive advantage. In this paper, I examined the strategic direction that the hypercompetitive environment and the social economic sector can grow together.

Strategies for creating a virtuous cycle between the hyper-competitive enterprise and the social economic sector can be largely considered in the following three dimensions. First, it examines the virtuous cycle structure between the hyper-competitive environment sector and the social economic sector through future studies, so called, foresight. The second is to establish a cooperative ecosystem within the innovation cluster between large enterprises and SMEs in the area of hyper-competitive environment sector. Third, the social economic ecosystem connected with this hyper-competitive environment sector is to be built around social enterprises. In addition to these strategies, various strategies for co-growth with the hyper-competitive environment and the social economic sectors can be derived. This paper is meaningful in that it examines such a hyper-competitive environment and social economic sector as a comprehensive frame rather than a dichotomical view. It is expected that many related studies will continue to develop such linkage frames in the future.

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