ICT Governance Restructure Plan in the era of 4th Industrial Revolution

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Abstract

In Korea, the public sector has yet to widely introduce the new ICT that embraces AI. The reason for this is because the public sector hesitates to give up its bureaucratic force of habit gained from the industrial society while still remaining insensitive to the changes occurring in the smart AI-based information society. Accordingly, to cope with the revolutionary changes, it is necessary to actively introduce the smart AI technology to the administration, and, thereby, innovate the government.

It is necessary for the next government to establish a new ministry that innovates the government administration through embracing AI and using ICT convergence as it lower infrastructure. Such ICT-based government innovation unit to be newly established must improve the current comprehensive foresight function and also convert the ICT convergence-based government innovation strategy into a presidential agenda, and, thereby, set it as a government project.

***Keywords**: ICT, Government Innovation, E-Government, Artificial Intelligence, 4th Industrial Revolution.*

1. Introduction

The humankind history has made a transition from the agricultural society to the industrial society, and then to the information society, and finally to the smart information society. As the scientific technology started to progress rapidly after the industrial revolution, the world has been changing more for the last 20 years than it has been changing for the last 5,000 years. Information & Communication Technology (hereinafter referred to as ICT) serves as a driver that causes such rapid changes in our society. Because such smart information society made more progress within the global network which used to be known as a global village, the entire world is now connected in real time, and the complexity became more sophisticated. Accordingly, because the progress in ICT increases the width, speed and interdependence of such changes, our society is making a rapid transition into the smart information society.

To cope with such smart AI information society, a number of private fields have been using such ICT to make innovative changes. Recently, Toyota Motor Corporation has been inducing most of its office employees to work in the smart work environment. However, in Korea, the public sector has yet to widely introduce the new ICT which includes AI. The reason for this is because the public sector hesitates to give up its bureaucratic force of habit gained from the industrial society while still remaining insensitive to the changes occurring in the smart AI information society [1]. Accordingly, to cope with the revolutionary changes, it is necessary to actively introduce the smart AI technology to the administration, and, thereby, innovate the government. Accordingly, to take anticipatory measures under such circumstances, the purpose of this thesis is to review the appearance of the 4th industrial revolution as well as the changes in the direction for operating the government from the perspective of establishing the ICT governance.

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2. Significance of the 4th Industrial Revolution

2.1. Arrival of the Era of AI

The ICT convergence and AI are playing an important role in making a rapid transition from the information society to the smart AI information society. For the internet, due to the global activation of the mobile internet through the smartphone, the number of wireless internet users has surpassed the number of wire internet users. Such arrival of the era of mobile has inevitably accelerated the construction of the intelligent customized services such as M2M (Machine to Machine), and, thereby, has brought the arrival of the era of IoT(Internet of Things).

In such era of IoT, it is necessary to essentially include the AI technology that can be used to understand the situations and provide the customized services without requiring us humans to become aware or make efforts. In addition, through the construction of the ubiquitous network based on the sensing technology and location-based service, all things are being categorized into one information unit, and, thereby, are causing a phenomenon where information infinitely increases [2].

Such phenomenon where information infinitely increases has brought the arrival of the era of big data. In the big data environment, how information is understood and interpreted is more heavily considered than how much information exists. Accordingly, rather than to provide as much information as possible, it is more important to provide correct information and services suitable for the 'circumstances' that occur in real time through the intelligent search, social search and situation awareness computing. Under such circumstances, the AI technologies, such as semantic web, pattern recognition, intelligent search, that understand the context of information and provide the customized services is becoming more important.

2.2. The 4th Industrial Revolution

The topic of the Davos Forum held in Switzerland in January 2016 was 'Mastering the Fourth Industrial Revolution'. The 4th industrial revolution is based on the ICT convergence. In the 4th industrial revolution, the products that apply new technologies, such as AI robot, IoT, mobile, 3D printing, driverless automobile, nano/bio technology will serve as the driving force of the social development. Such technical innovation will not only change the way the industries, societies and governments are controlled, but also revolutionarily change the way that the normal people live. Based on such 4th industrial revolution, we are approaching a new world that will fundamentally change the ways of our lifestyle and work environment. The scale, range and complexity of such changes will be completely different from what humankind has ever experienced before.

The 4th industrial revolution society is more of an 'intelligent society where all things are connected'. The CPS (Cyber-Physical System) will be constructed based on the integrated system that uses the IoT and AI to create a network between a cyber world and a virtual world. Just as it is for the current smartphone, the hardware will update itself automatically as it accumulates and interprets data. In addition, the robot and AI will be combined and cause automation. Such AI processes languages and images based on the big data, and, thereby, makes complicated decisions as well [3].

Although the 4th industrial revolution is capable of rapidly increasing the efficiency and productivity, it received attention from the perspective of 'job shock'. At the Davos Forum, it was pointed out that the progress in the robot/AI will take away our jobs and intensify the unequal distribution of wealth.

Klaus Schwab, the chairman of the WEF, made a forecast and said "The 4th industrial revolution is advantageous to the people with the capital, talent and best knowledge. However, it is disadvantageous to the service employees. In the long-term, it may result in a collapsing of the middle class. This could be a very serious threat to democracy."

The WEF made a forecast through the future of jobs report that universalizing the robot and AI through the 4th industrial revolution will disappear 7.1 million jobs within the next 5 years in the 15 nations consisting of advanced nations and other nations with emerging markets. Only 2.1 million jobs will be newly crated during this period. In particular, the office/administration-related jobs (4.75 million) that related to repetitive task performances will disappear. In addition, the

manufacture/production-related jobs (1.60 million), construction/mining-related jobs (0.49 million) and art/design/environment/sports/media-related jobs (0.15 million) will disappear as well.

On the other hand, a number of reports are pointing out that the AI and robot will take over the tasks that are currently being conducted by the humans, and thereby, create hundreds of thousands of unemployed people within the next 10 years. Moreover, a number of articles are pointing out the jobs at risk of disappearing through selecting the jobs suitable for the robots. As the AI continues to makes progress, it is obvious that a discussion for reducing labor forces may take place just like in the past, when the automation was initially applied. However, the aspect that is required to be more importantly reviewed is whether or not the government appropriately recognizes the paradigm of the society changes caused by the ICT development, and whether or not the government takes appropriate political measures [4].

Accordingly, in such AI-based smart intelligent information society, the ICT-based collective government innovation must be attempted for the government to recognize that its competitiveness can be reinforced and that it is important to take anticipatory measures.

3. ICT Governance Restructure Plan for the New Era

As described above, the intelligent information technology allows robots (factory-automation robots) automobiles (driverless automobiles) and ICT devices (personal assistants) to autonomously operate without requiring human interventions, and such technology has brought major changes to all the industrial fields. Such arrival of the 4th industrial revolution is expected to not only innovate the ICT industry, but also fundamentally change our economy and society's production method, market structure and life style [5]. Moreover, it is expected that a major change will be brought to all the fields relating to the public sectors such as the structure, operation and administration of the government. Accordingly, to adequately cope with such mega trend, the next government will be required to re-establish its ICT-related governance.

3.1. Significance of Re-establishment of ICT Governance

In today's complex administrative environment, it is inevitable for a number of related ministries to cooperate in order to deliver their administrative services to the people through a one-stop or non-stop method. Provided that the individual ministries promote the E-Government that requires enormous amount of resources and efforts without making mutual adjustment, overlapping investments may bring chaos to the use of resources. Accordingly, in order to effectively actualize the ICT-based government innovation, it is essential to organize a government-wide promotion system. In this context, it is understandable that a number of nations have been installing their own government-wide promotion system.

Actualizing a future ICT-based governance system is not limited to the functions of a single ministry. In order to set up a new framework for the future smart government, it is necessary to set a direction pursued by the entire government. In addition, once the direction is set up, it is also necessary to adjust the government's subordinate sectors to that direction. Accordingly, provided that actualizing the future ICT-based governance system is considered constructing a framework for the new government, the future ICT-based governance system must be actualized at a government-wide level.

However, a problem is caused from two large perspectives. The initial perspective is the political perspective of ICT governance. This problem appeared while E-Government was actively promoted as the presidential agenda of the Roh, Moo Hyun's government in the past. Having accomplished the regime change, the Lee, Myung Bak's government cultivated and applied new policies to all fields in the name of "The Lost Decade" to differentiate his government from the previous government. In the process, Ministry of Information and Communication was abolished, and a number of central ministries and subordinate institutions were either abolished or integrated. Accordingly, permanence of the policies disappeared in diverse fields, and the E-Government is one of the representative fields.

The use of the term E-Government was nearly prohibited, and the term was replaced with the term National Informatization. The Lee, Myung Bak government held the National Informatization Vision

Proclamation Ceremony on 3rd December 2008. At the ceremony, President Lee, Myung Bak stated that the informatization was too loose. He continuously ordered budget cuts in the field of informatization.

The Lee, Myung Bak government established its ICT governance through establishing Presidential Committee on National Informatization. In the process, Korea scored the first place in the Evaluation of the 2010 UN E-Government Development Index. Such result is based on the fact that the 31 E-Government Projects carried out by the Roh, Moo Hyun's government were commercialized and sophisticated. Accordingly, it is necessary to policies from the perspective of time-lag approach.

The Lee, Myung Bak government established Presidential Committee on National Informatization on 10th March 2010, and confirmed the 10 National Informatization Projects. Presidential Committee on National Informatization established and reported the smart work activation strategy to President Lee, Myung Bak in July 2010. Presidential Committee on National Informatization then announced its smart E-Government promotion plan in February 2011, and reported its plan for actualizing the smart government through knowledge information opening and cooperation to President Lee, Myung Bak in November. Finally, Presidential Committee on National Informatization reported its big data master plan for actualizing the smart nation and its platform-based future E-Government report in November 2012 [6].

As described, the Lee, Myung Bak government made efforts to promote a government-wide informatization strategy through installing Presidential Committee on National Informatization. However, it can be evaluated that the informatization projects were only promoted by the ministries from the perspective of national informatization, and that the collective administrative innovation that uses the information technology was never promoted.

3.2. Analyzing Problems within the Park, Geun Hye Government's ICT Governance

3.2.1. Political Perspective- Promotion of New Government Projects

The Park, Geun Hye government has been promoting policies through focusing on the Government 3.0 that pursues to change the governance [7]. In the process, Presidential Committee on National Informatization established by the Lee, Myung Bak government was abolished. Such abolishment of Presidential Committee on National Informatization can be seen as an action that eventually weakened the national informatization promotion system in the process for differentiating the current government from the past government.

However, the problem is about justification and function. As the Park, Geun Hye government was established, it announced that no committee will be newly established because the committees were loosely operated in the past government. Accordingly, Although the Park, Geun Hye's government abolished Presidential Committee on National Informatization, it newly established 3 committees that relate to informatization within two years from the government's establishment. Since the establishment of E-Government Committee, the Park, Geun Hye government has been currently operating 4 committees. It is uncertain whether or not such committees will be maintained in the next government. Provided that every government establishes a new committee that relates to informatization to temporarily promote tasks and become abolished, it will be difficult to expect the policies to secure permanence.

Accordingly, we must take it as a lesson that the US E-Government promotion system is maintained to promote consistent policies regardless of the regime change. Politically using the informatization promotion system will end up creating a vicious circle where the system will be repeated abolished every time the regime change is accomplished.

In addition, what is more important is the information of the policies. Currently, a number of people are unaware of the difference between Government 3.0 and E-Government [8]. In particular, the personnel who played a role in Presidential Transition Committee prior to the established of the Park, Geun Hye government stated that Government 3.0 is unrelated to E-Government, and that Government 3.0 not only is based on more of a superior concept, but is also an innovative method for running the government. Accordingly, this caused a problem.

In conclusion, of course, Government 3.0 is not the same as E-Government. However, Government

3.0 cannot make success without the help of E-Government. Government 3.0 is just a means for using the information technology to support the objectives and strategies set by the Park, Geun Hye government. Accordingly, it is certain that Government 3.0 will be abolished in the next government. As described, as far as informatization is concerned, substituting in a political perspective will make it impossible for any policies/organizations to be maintained.

In the past, the Lee, Myung Bak government approached E-Government through recognizing it as achievement of the Roh, Moo Hyun government. Accordingly, from the perspective of being differentiated from the past government, the Lee, Myung Bak government insisted that it is no longer necessary to succeed to the E-Government policies. Likewise, it is likely that the next government will not succeed to the Government 3.0 policies set by the Park, Geun Hye government, and, therefore, such Government 3.0 policies will not be sophisticated into the Government 4.0 policies. Accordingly, in this case, it is likely that the system will return to the broad principle known as E-Government.

As far as the promotion of Government 3.0 is concerned, President Park, Geun Hye has been demonstrating a quite outstanding leadership. She led the discussion from the start to the end during the Government 3.0 Promotion Plan Presentation held in June 2013. She also participated in the Government 3.0 Experience Festival held in 2015 and 2015. However, since the confusion caused by the concepts between Government 3.0 and E-Government are not organized and the first-line public officials are not functioning properly, it is unknown whether or not the performance will be visualized. Actually, President Park has been encouraging the ministries to disclose information, but even the most basic data that represent the ministries are not posted on the official website of the ministries. Such information disclosure level falls significantly behind in comparison to the Roh, Moo Hyun government.

Moreover, some of the local governments in which a member of the opposition party serves as the head recognizes Government 3.0 as a political project planned by the Park, Geun Hye government rather than as an administrative innovation that uses information technology. Accordingly, Government 3.0 is either barely introduced or serves as a barrier to activation. The reason for this is because the personnel who promoted the Government 3.0 polities appeared as occupation forces, and, thereby, caused the lower level public officials to create hostility. Because such forceful atmosphere was maintained throughout the early stage, regardless of how much education on Government 3.0 is provided, it is difficult for the front-line institutions to welcome Government 3.0. Accordingly, applying a political rhetoric to the ICT-related policy may serve as a huge burden in the later period.

3.2.2. Problem with Promotion System- Modification of Promotion System

In the Park, Geun Hye government, Ministry of Government Administration and Home Affairs has been promoting Government 3.0 and E-Government. Currently, the creative administration division is in charge of Government 3.0 and the E-Government office is in charge E-Government. However, the problems is that these two division and office are separated. Accordingly, using E-Government to support Government 3.0 is limited due to the current organization.

In order to resolve such problem, it is necessary to restructure the creative administration division. The creative administration division functions to fulfill its primary tasks originally given to the division. The members of the creative administration division that are in charge of Government 3.0 will be in charge of the primary tasks originally given to the division in the next government. Accordingly, although the president is very interested in Government 3.0, the public officials in charge may think of it as a temporary task. Accordingly, it would be more appropriate for the next government to separate the tasks currently given to the creative administration division and convert this division into the government innovation division, Then, the E-Government office must be categorized under the government innovation division, and a larger government transformation strategy unit must be newly established.

In the next government, the government's collective transformation based on the information technology will be inevitably promoted through E-Government instead of Government 3.0. This means going back to the basics. Although E-Government was initiated from the collective government innovation, the Park, Geun Hye government chose to stick with Government 3.0 with a purpose to pursue national happiness through the customized government. Such Government 3.0 created jobs in

the initial stage through disclosing the public data through using very small part of E-Government. Although it claims to stand for the administration known as 'Government at Your Fingertips', its service quality is similar to that of the mobile E-Government presented by the past government.
Accordingly, instead of promoting Government 3.0 or Government 4.0, the next government is required to promote the ICT-based collective information transformation that copes with the smart intelligent information society. It is necessary to be reminded that E-Government Special Committee initially established in Korea by the Kim, Dae Joong government was categorized under Government Innovation Committee.

4. Direction for National Informatization

The Park, Geun Hye government newly established Ministry of Science, ICT and Future Planning immediately after its establishment to promote Creative Economy. It is obviously important to establish such ministry in the era of ICT convergence. However, since only the industrial aspects of ICT are being emphasized, E-government serving as one of the unique functions of the national informatization is being less emphasized. ICT being considered a driving force of the future may be important. However, the government must promote the national informatization policies through separating them from the industrial policies and concentrating on the public sector. In detail, the following policies must be promoted so that the rapidly progressing information technologies can be introduced to and expanded in the public sector.

Initially, it is necessary to come up with a strategy that will reduce costs and enhance communications through applying the ICT-based new technologies (virtualization, Cloud computing, cooperation technology and etc.) to the public sector. In addition, it is necessary to come up with a plan to expand the use of ICT so that the social issues can be resolved through restructuring the medical welfare system and providing a low-income group with an opportunity to receive more education in preparation for the aging society.

Secondly, it is necessary to sophisticate the infrastructure and service channel of E-Government to which the new information technologies are applied. It is necessary to activate the services provided in the currently constructed E-Government systems through continuously promoting the sophistication project. Currently, the electronic civil complaint administration service has been rapidly expanding through the internet, mobile and app. Accordingly, it is necessary to come up with a strategy for sophisticating the rapidly changing information technologies and infra channels. Through such process, the future E-Government must make a transition to the platform government [9].

Thirdly, it is necessary to revise the related laws and systems that serve as barriers so that the information technology can be actively applied to the public sector. Since such legislative systems are revised not through simply revising the legal provisions, but through the political agreements reached based on a strong leadership demonstrated by the president, it is necessary to pay continuous attention to this field.

Fourthly, it is necessary to adjust the governance paradigm to the digital era through E-Government. It is necessary to escape the previous method where the government enlightens and rules the people. Instead, it is necessary to establish and practice a strategy for promoting E-Government so that a virtual space can be used to induce the people to participate and communicate.

Actualizing E-Government is not about a system that can be perfected by a certain government or president. From the perspective of technicality, the E-Government system is nothing but a lower infrastructure of the government. Such E-Government must be recognized as a governance paradigm suitable for the knowledge information society rather than as a system. Accordingly, it must be understood as a national policy to be consistently promoted regardless of the regime change. In addition, it must be approached from the perspective of using information technology to recreate the government rather than from the perspective of simply disclosing the data owned by the government.

Essentially, actualizing E-Government accompanies changes in the methods used for carrying out the administration ranging in all area of the government, considerable changes in the administrative structure as consequences, and changes in the consciousness of the public officials. Accordingly, actualizing E-Government not only introduces information technology to the individual administrative institutions, but also uses information technology to redesign the administration process, and, thereby,

changes the actual administration process and promotes a collective transformation of the government. Accordingly, E-Government not only promotes administrative informatization through simply introducing information technology to the administration, but also uses information technology to promote a collective transformation of the government.

Recently, the Park, Geun Hye government stated that Government 3.0 is the government innovation and also stated that "the successful promotion of Government 3.0 has allowed E-Government to be recognized as an important strategic key to the government innovation". However, in the early stage, the Park, Geun Hye government stated that Government 3.0 is unrelated to E-Government, and that Government 3.0 is the best customized citizen service. As described, Government 3.0 has been changing its political basis annually and its promotion system has been established after the golden time was missed. Accordingly, Government 3.0 has never proven its status as to leading the government innovation. Accordingly, it is necessary for the next government to design an organization that is capable of collectively leading the government innovation through the ICT convergence so that the information technology and administrative innovation do not become separated.

5. ICT-based Future Strategy Convergence

Governance signifies the interaction and network that are established among government/citizen/market while solving the social problems. It also signifies the activities, processes, methods and systems that relate to governing [10]. Namely, it signifies not only the citizen participation that determines how the authority is exercised in the process for managing the public goods and services provided by the nation, but also the government's ability to establish and enforce the policies, laws and systems. Such governance increases the citizen participation and responsibility, and enhances the national competitiveness through controlling the political stability, government effectiveness, regulation quality and corruption.

In the future, the key factors to the AI-based smart administration management are participation and openness. In the field of public administration, diverse discussions on the future administrative organization have been made since long ago [11]. In addition, the future government model was defined as the intelligent E-Government. The intelligent E-Government was divided into the interactive government, informative government and integrated government [12]. It is ICT that plays the most important role in the citizen participation and communication within such future government. ICT will expand the government efficiency and citizen participation through the smart governance, and also reinforce the national competitiveness through playing an important role in transparentizing the decision making process and controlling the corruption.

Accordingly, instead of relying on the hard power through investing in the preexisting ICT equipment and infrastructure, it is necessary to establish a smart governance innovation strategy in order to introduce the smart AI having infinite potentials to the governance. In particular, it is very suggestive that the communication and social integration are not very active in Korea although Korea has developed diverse social network services as a leader in ICT.

Accordingly, It is necessary for the next government to establish a new government ministry based on the ICT convergence that includes AI in order to innovate the governance. Such ICT-based government innovation unit to be newly developed must not only improve the current comprehensive foresight function, but also upgrade the ICT convergence-based government innovation strategy into the Presidential Agenda, and, thereby, set it as one of the government projects.

After naming this ministry as Ministry of National Revolution Planning (provisional name), it would be necessary to secure the organization independence and ICT convergence-related expertise and long-term sustainability. To secure its organizational independence, this ministry must be established as an institute directly responsible to the President, and it must absorb the preexisting ICT Strategy Committee and E-Government Committee. In addition, to secure its expertise, it is necessary to sufficiently gather experts from diverse ICT-converged fields. In detail, it is necessary to operate this ministry through cooperating with the current National Information Society Agency, National IT Industry Promotion Agency, National Computing and Information Service, Future Strategy Center and Public Information Sharing Center to newly establish or transfer the systems and functions. To secure its long-term sustainability, it is necessary to establish legal/institutional systems for maintaining this

ministry regardless of the regime change. To make this happen, it is necessary to revise the related provisions specified in not only the Government Organization Act, but also the Electronic Government Act, so that the Minister of National Revolution Planning (provisional name) can be designated as the national CIO to lead the central ministries, local government and CIO Committee.

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