RECOMMENDATIONS TO THE GOVERNMENT FOR THE FOURTH INDUSTRIAL REVOLUTION
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Publication Remarks

The Presidential Committee on the 4th Industrial Revolution, as a communication channel between the private sector and the government, has put together recommendations to the government of the Republic of Korea by collecting opinions from members of the private sector who are active agents of change. I hope these recommendations would play their role to help the government prepare for a new future in the course of trial-and-error.

In recent years, there’s no doubt that ‘jobs’ is one of the biggest topics in Korean society. Not only for the youth, but also mid-aged workers and retirees want more stable and better jobs. Jobs are not only a means of living, but a basic element that enhances the quality of life.

In the 4th industrial revolution, when everything is expected to be revolutionarily changed, there’s a growing anxiety about ‘jobs’. The 4th industrial revolution can threaten job security. Governments take the lead by implementing various policies, but they are hardly recognized by the citizens. As the chairperson of the Committee, I feel a heavy burden.

One thing for sure is that it is citizens and companies that can change fear of the future into hope. Governments establish policies for their citizens and their nations, while it is inevitable to witness discrepancies in reality or changes in different times in changes amid rapid changes. This is why opinions from the private sector become more important as they are the ones who have first-hand experience of the wave of changes.

Thus, the Presidential Committee on the 4th Industrial Revolution, as a communication channel between the private sector and the government, has put together recommendations to the government of the Republic of Korea by collecting opinions from members of the private sector who are active agents of change. In particular, the Committee pays attention to the fact that the 4th industrial revolution isn’t accompanied by simple technological changes. Measures to respond to the 4th industrial revolution should include topics using a holistic perspective such as: from global industrial competitiveness and land/labor/capital, to changes towards talents/smart capital/data, social innovation in labor/education/social security, intelligent infrastructure for innovation and industry-specific measures.

The Committee had in-depth discussions and debates with private committee members for about 9 months. Not only the committee members but over 60 other participants have been dedicated to such discussions. Those participants include managers from the supporting group, experts from each field, and stakeholders from relevant research institutes. On behalf of the Committee, I would like to appreciate all the participants for completing their long-term work with infinite passion.

As the Committee’s recommendations pursue changes and innovation, there may be controversy in many aspects. Former Chairman & CEO of General Electric Jack Welch once said that we should be able to prepare ourselves for powerful resistance if we pursue changes. Changes are always painful and difficult. Unless we pursue changes, however, changes will force us to be changed.

There’s no such policy that is perfect in this time of huge revolution. The best scenario is to constantly challenge ourselves and have trial-and-error to improve in the future. It is important to admit failure and quickly fix it to improve. I hope these recommendations would play their role to help the government prepare for a new future in the course of trial-and-error.

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Chairperson Byung-gyu Chang
Presidential Committee on the 4th Industrial Revolution
“China has missed three chances to take part in industrial revolutions for the last 200 years amid global industrialization and modernization. In the course of the three industrial revolutions, China was a nation of constant change, which fell behind. Accordingly, the Chinese economy that used to account for 1/3 of the world’s GDP in 1820 worsened down to the level of 1/20 in 1950.”

China in the emerging stage of the 4th industrial revolution,
Beijing Daily February 25, 2013, Professor Hao Angang of Public Policy & Management at Tsinghua University

1. Emergence of the 4th Industrial Revolution

The 4th industrial revolution is now a reality that the whole globe encounters. In a more direct context, it means the emergence of ‘artificial intelligence (AI), while it also means revolution throughout society due to the unprecedented fast pace of the development of science and technology in the mid-to-long term. AI shows great differences from those technologies in the past as it helps machines carry out some intelligent work by learning from massive data from our connected society. Alpha Go was a clear example that proved the fact through the game Go. Technological innovation is entering into the cognitive area of humanity. Unlike the past industrial revolutions, the current one is accelerating job changes in different aspects. Accordingly, such changes require quantum leaps throughout all of society, including industry and the economy.

The spirit of the era of the 4th industrial revolution could be summarized as ‘VUCA’: It is the combination of volatility, uncertainty, complexity and ambiguity. We are now living in a ‘VUCA’ era thanks to the rapid development pace of AI and other aspects of science and technology.

In the era of a huge revolution, it is important to be critical about the past or existing rules. It is no longer valid to apply the top-down approach to prepare for the future with exquisite plans, which is led by certain leaders or organizations such as government. Rather, it is more effective to develop the future through ‘tenacious challenge’ and ‘wise trial-and-error’, it is time to review the direction, vision and policies that our nation should have in a more comprehensive manner.
2. Customized Jobs to the Citizens

‘Anxiety in abundance’. That is what South Korea is facing. Despite the achievement of earning USD 30,000 of the GNI, having the 10th largest economy in the world, and having the highest life expectancy around the globe, Korean citizens can’t find the benefits. As half of the citizens don’t identify themselves as middle class, concerns about the future grow bigger than before. Most citizens live their lives worried that their situation would get ‘worse’.

You can find the root of these concerns from ‘jobs’: this doesn’t only apply to the current jobs but the future ones. As people worry more about the future of their jobs, anxiety gets worse and deeper. Compared to the era of ‘Miracle of the Han River’, the current anxiety arisen from job issues is at a worrisome level. There are widespread negative thoughts and sentiments among the youth that their generation will witness poorer conditions compared to the generation of their parents.

Citizens have become more sophisticated: their expectation for so-called ‘good jobs’ is higher than at any other time, while their anxiety about jobs is widely spread. Civil servants, jobs with ‘work-life-balance’ and regular/permanent jobs are regarded to be ‘good jobs’. Along with worse anxiety and higher expectations for jobs, the existing quantitative measures are too simple to solve job issues.

Job changes due to the 4th industrial revolution amplify these issues. In the perspective of what leads innovation and changes, there are constant voices expressing concern that we do not have enough talents with innovation and creativity. There are new types of jobs that are not conventional types of jobs working for companies: one-person entrepreneurs and freelancers are good examples. Through platforms that can instantly connect those in demand to those providing services, workers of such new types of work raise their voice asking for ‘jobs to be better’.

AI is expected to bring more changes for jobs of mid-skilled workers rather than unskilled or skilled workers, which applies to current college graduates. Changes are already underway in a fast and unpredictable fashion before society is even ready with new laws and regulations.
3. Changes of Global Industrial Competitiveness

Jobs are going through global competition. Korea’s shipbuilding is a good example: the cost is huge when you lose competitiveness, which will lead to job losses and anxiety in citizens.

The 4th industrial revolution brings down the borders between countries while the mobility of supplies and people improves. Accordingly, global industrial competition gets accelerated. In particular, various platform services boost trans-border phenomena and competition among countries as smart phones and their infrastructure develop.

Instead of watching conventional TV channels, people are more likely to watch video streaming services by multinational companies.

The competitiveness loss of those conventional channel is expected to cause potential job issues. For booking accommodation, multinational companies’ reservation services are more likely to be used instead of booking by phone calls.

The 4th industrial revolution is a crisis and opportunity: in this time of rapid changes, there will be more jobs in some countries, while less jobs in others. Before witnessing job replacement by AI, we may have to worry about job loss as well as Korean companies falling behind and their bankruptcies due to enhanced competitiveness from overseas companies.

The more the Korean government spends time to adjust vested rights within the frame of the domestic market, the more overseas companies newly emerge with powerful capital and competitiveness. This could result in a monopoly or oligopoly in the Korean market.
4. Talents, Data, Smart Capital

There are many changes found in core elements that can decide global industrial competitiveness. As the labor-intensive and capital-centric growth is reaching its limit, traditional manufacturing elements such as land, labor, and capital are no longer the cornerstone. It requires the advancement of manufacturing factors including talents, smart capital, and data.

1. Talents

Talents are different from traditional laborers including workers in manufacturing lines or office workers who follow set processes. In manufacturing lines, there’s not much difference between the best and normal workers in terms of their achievements. However, there could be a big difference between the best software engineer and regular engineers by a couple of or dozens of folds. Furthermore, those regular engineers may not be able to proceed with what the best engineer does.

A few startup owners create new companies and jobs with the spirit of entrepreneurship and it is those masters who explore their own field by themselves who enhance industrial competitiveness globally.

Unlike those traditional laborers, talents own their own manufacturing means. When a talent transfers from a Korean IT company to an overseas one, he/she can still utilize the same development environment. It is possible as those companies do not own manufacturing means, unlike with factories.

Laborers carry out their tasks based on set processes, while talents work for themselves to enhance their own value. In the course of tackling some challenges to find value amid uncertainty, those talents go through countless failure and trial-and-errors in order to accomplish some results.

Talents are evaluated only based on their performance, while laborers are with their work hours. Laborers achievement has a lot to do with work hours, but the hours have nothing to do with talents’ performance. Regarding HR management, organizations pay more attention to effective collaboration and strict performance evaluation rather than detailed instructions and monitoring. In Silicon Valley, no company checks out their employees’ clock-in and clock-out times. However, layoffs often happen there.

In particular, talents play the key role to enhance global industrial competitiveness in the era of the 4th Industrial revolution. Multinational companies show fierce competition or sometimes engage in ‘war’ to draw talents. It is not so rare to see anymore that Korea’s outstanding talents are working in multinational innovative companies.

2. Data

As data meet AI, the landscape of global industries has changed. To develop autonomous vehicles, lots of data are required. The more data from actual driving tests you have, the more developed autonomous AI driving will be. As autonomous vehicles become more popular, the mobility industry goes through full-scale changes. It is not the conventional automotive industry that leads autonomous driving; it is large IT companies or new automotive companies.

The more data we have, the more rapid changes we will witness in healthcare. Photo data recognition is already using AI technology in reality. The more information, including DNA, medical records, and individual life logs we secure, the more innovation we can witness in medicine, medical, caregiving programs and insurance. Innovative healthcare companies can take the lead to resolve aging problems, which is a universal issue around the globe.

Various industries, including finance, smart cities, manufacturing, and
As data becomes more and more important, competition among companies and countries gets fiercer to secure data.

law, can create new value and global competitiveness by combining data and AI. In the course of that, we have talents.

It is an urgent task to create a data ecosystem in order to enhance industrial competitiveness while producing and utilizing high-quality data throughout all industries. As data becomes more and more important, competition among companies and countries gets fiercer to secure data. In addition, we are witnessing some countries’ vibrant movement to protect their own data. These phenomena illustrate why we need to secure “data assets” and enhance the value of our data.

Smart Capital

Smart capital is also important as talents lead various innovations by using data and AI. Traditionally, capital had quantitative characteristics as it was introduced into manufacturing in industries. Smart capital means, however, qualitative capital that supports the overall life cycle of innovative companies including birth, growth, extinction, mergers and spin-offs. Smart capital provides a basis of challenges and trial-and-error to overcome uncertainty. It is somehow “patient but adventurous capital” that accelerates innovation.

In the past, large trading companies supported local expansion including global entry of companies. Nowadays, however, this supporting role has decreased, while smart capital plays its role to support local expansion.
5. Government as Assistant

The government should clearly distinguish the differences between talents in the era of industrial revolution and traditional laborers. As the whole globe is going through the rapid changes of the 4th industrial revolution, it is essential to have global industrial competitiveness in order to create jobs that are customized to citizens. This would be possible thanks to ‘wise trial-and-error’ through talent, data and smart capital instead of land, labor and traditional capital.

The government is required to create an environment for infinite challenges by talents. The era of VUCA is created thanks to challenges and wise trial-and-error rather than future prediction. The government policies should be implemented in the direction of supporting talents’ birth, growth and challenges in a consistent manner. Also, there are innovative tasks for intelligent infrastructure (e.g. AI, blockchain, cyber security) and social systems (e.g. labor, education). Moreover, there should be policies to embrace the socially vulnerable and also minors as changes emerge.

The government should also be an assistant for innovation in the private sector. There are unique roles and responsibilities, characteristics, and advantages of the government. However, the private sector has some areas that they do better than the government, such as uncertainty, challenges, trial-and-error, innovation and global competition. It wouldn’t be ideal if the government intentionally controls some tasks in industry and education through regulations. It is the government’s role to support the market economy through social consensus. That includes regulation innovation and conflict mediation. In particular, the government should keep in mind the principle of ‘private-led, government support’. when carrying out industry-specific strategies while taking national competitiveness and intelligence into consideration.

It is also required to innovate how the government has been doing its role. This means that the government should require its members to develop efficiency and creativity on top of the traditional standards including transparency and fairness.
6. Recommendations by Area

Social Innovation

The government’s tasks become clear once the goal ‘To create high quality jobs meeting citizens’ expectations’ becomes clear through innovation and intensifying global competitiveness. It is furthermore important for the government to support eliciting the potentials of ‘talents’ who lead innovation. This is why reform in the labor, education and social security systems is more important now than in any other time.
1. Labor:

**Embracing Labor Diversity, Minimizing Government’s Controls**

Reform in the labor system could be the most difficult but urgent task. Korea’s labor system still remains similar to that of the 2nd industrial revolution, which can’t reflect diversified changes in labor due to the 4th industrial revolution or embrace talents that lead innovation. The existing labor system can’t include the recent concepts such as ‘the gig economy’ or ‘platform laborer’ and their relevant changes. Uniform application of the 52-hour work week makes it hard for companies and laborers to voluntarily respond to changes. This results in some concerns that the current labor system would be an obstacle for talent growth, or that corporate competitiveness could become weak.

Every regulation has its meaning and purpose, but it is a problem to force society to apply uniform measures in this rapidly changing society. In the future, changes in laws will be required in the labor system in a way that companies and individuals can make voluntary decisions and the labor system can respond to various labor types in a flexible manner, while securing laborers’ basic rights including the right for health.

2. Education:

**Innovation in Higher Education Including College Autonomy**

Korean universities’ global competitiveness has become weaker and weaker. The core of changes in talent nurturing is reform in higher education. In order to nurture talents who at the present time are required for global competitiveness, it is essential to reform the overall university education.

The government should prepare for innovation basis. To that end, it is required to consistently implement restructuring in the mid-to-long term by diversifying types of universities that can transform themselves into R&D-based ones in order to lead the 4th industrial revolution. Also, it is necessary for the government to help strengthen college autonomy through various trials under the purpose of creating competitiveness for nurturing talent so that colleges can become actors of innovation. Accordingly, universities and colleges should be responsible for obligations arising from autonomy (e.g. natural extinction of the organizations) while drastically expanding their budget and autonomy for decision making such as implementing voluntary introduction of tuition.

3. Social Security:

**Establishing Firm Safety Net that Encourages Innovation**

Changes throughout the overall nation’s society due to the 4th industrial revolution inevitably will be accompanied with fear. The social security net should be strengthened so that society is not afraid during the course of challenges and innovation. It is necessary to have a basis so that talents can freely challenge themselves with. While securing stable lives by sharing achievements through technological innovation, society needs to start a detailed discussion to establish an innovative and ‘inclusive society’ as the basis for talents.
Under the principle of “private-led, government support”, the government needs to secure industrial basis where innovative talents emerge. As the implementation speed of the 4th industrial revolution may vary depending on industry, it is required to have industry-specific measures to respond to changes. In particular, these recommendations suggest certain industries that can have bigger ripple effects due to intelligent innovations, such as bio-health, manufacturing, city, finance, and mobility/logistics. The industry of agricultural/fishery products are also included as it has a lot of potential in terms of food security and future strategy.

1. Bio-health:
Advancing Regulations at the Global Level, Revitalizing Utilization of Individual-led Medical Data

Bio-health is capable of having one of the biggest ripple effects in the era of our aging society and the 4th industrial revolution. South Korea has huge potential as the nation is well equipped with health data from sources such as the National Health Insurance Service and a talent pool with a higher education background in bio-health. However, the development pace of the industry has been slow due to uncertainty in laws and regulations and deep conflicts among stakeholders.

To secure global competitiveness, the government should continue preemptive improvements of regulations throughout the overall medical system (e.g. clinical tests, information utilization, fee-for-service). In addition, “revitalization of using individual-led medical data” needs to be implemented by strengthening the rights of individuals to decide matters of their health information; securing interoperability through data standardization; and keeping consistent policies to develop data-based services.

2. Manufacturing:
Supporting to Establish Open Horizontal Ways of Collaboration

Traditionally, Korea has been a manufacturing powerhouse. However, the horizontal industrial ecosystem that is centered around large companies and has acted as a strength is now an obstacle. Numerous smart factory policies implemented by the government thus far haven’t had great results because the government used to stick to technology applications without any innovations throughout the overall industries.

In order to create innovative achievements that would be suitable for the rapidly changing manufacturing environment, it is essential to form a collaboration basis with close relations between not only industry, academia and R&D institutes, but also innovative actors of large companies and small-and-medium-sized businesses. Based on such an open and cooperative network, the government should continue to support the establishment of industrial platforms and big data in manufacturing, which can create new products and services.
3. Finance:
Expanding the Roles of Smart Capital that Supports the Life Cycle of Companies

Finance should strengthen its role as "smart capital", which can encourage corporate challenges and innovation. Financial institutions should go beyond the traditional corporate finance that used to evaluate companies and lend loans based on their revenues and assets. New changes are required as "patent but adventurous capital" that evaluates companies technology and future potential for growth in more comprehensive manners based on the life cycle of companies. While building the capability to evaluate corporate technology and future potentials for growth, it is required to establish support systems for innovative growth such as raising venture capital, investment financing and acquisition financing. Here, the government's job is to ease regulations for financial companies so that they can become supports for innovation. Also, the government needs to introduce the transfer of personal financial information in a timely manner in order to revitalize various finance companies and services.

4. Mobility/Logistics:
Suggesting Detailed Vision to Respond to Destructive Changes

The mobility/logistics area experiences enormous changes as much as it can due to intelligent innovations. Accordingly, there are a lot of social conflicts, including job issues, which delay innovation. If the government neglects these circumstances, it makes it difficult for relevant companies and industries to secure their competitiveness and participate in the global market.

The government should prepare detailed strategies that can grow the relevant markets and industries step by step while taking the future and its citizens into consideration. Also, it is the government's responsibility to secure the detailed blueprint regarding how to adopt service and technological elements that may bring destructive changes step by step; what types of changes we have and what we need to prepare; and what systems we need to improve accordingly.

5. Smart City:
Establishing a Cooperative Implementation System Through PPP

A smart city is a comprehensive platform that applies convergence technologies of the 4th industrial revolution. Korea’s first smart-city-related law was established (U-CityAct) to lead the industry, while the nation experienced failure in creating markets due to public-development-oriented policies. It is now impossible to secure the sustainability if any governments implement public-led policies only due to the limitations of budget and administration.

The government needs to design the framework of the smart city policy while collaborating with private companies and civil society. Through the current cooperative implementation system of the national pilot city in the PPP (Public-Private Partnership) fashion, the government should make sure that it secures sustainability in project implementation. Citizens, who are those in demand, should participate in the stage of urban creation and companies should create such an innovative ecosystem that companies develop and provide services for. Also, thanks to the establishment of the systematic cooperative system, fleet-type strategies for overseas market entry need to be established.

6. Agricultural/Fishery Productsy:
Strengthening Potential as New Industry by Revitalizing Challenges and Trial-and-error

The area of agricultural/fishery is a promising industry with massive global markets. In order to transfer Korea’s agricultural/fishery product industry into a future-oriented one, it is necessary to actively introduce the technologies from the 4th industrial revolution in order to overcome current systematic limitations and create various business models. To that end, it is important to secure a basis in which vibrant challenges and trial-and-errors are happening. Here, the government should create an ecosystem where R&D in agricultural/fishery products is encouraged and various startups are born.
In order to boost social and industrial innovation, it is important to have the whole set of “technology-data-startup ecosystem”. In particular, the government needs to pay more attention to AI, cyber technology and blockchain in terms of technology.

1. AI/Data:
Establishing a Safe and Free Utilization Basis of AI and Data

In the center of the 4th Industrial revolution, there are AI technologies and data; the competitiveness of the 4th Industrial revolution will be decided depending on whether AI technology and data take the lead. However, Korea’s AI technology falls behind other competitor countries. There’s also a lack of a talent nurturing basis. Due to systematic uncertainty, data are not properly utilized or distributed.

The government should realize that AI and data issue will decide the nation’s destiny and nurture these industries in a more active manner. It is furthermore important to nurture ‘convergence-type AI talents’ who are based on the expertise of individual industries. Also, it is required to secure a legal, systematic and materialistic basis to boost data utilization and distribution while improving laws and regulations regarding privacy, which hasn’t shown any progress for years.

2. Cyber Security:
Transferring Cyber Security Policies from Domain-centric to Data-centric

Unless there’s concrete cyber security, all the efforts regarding the 4th industrial revolution will become a house of cards. It is more meaningful than before to make sure of securing reliability and security by design for 5G communications networks and IoT (Internet of Things) devices; and utilization of collective intelligence and supply chain security for external security professionals.

Nevertheless, it is not ideal if security becomes another regulation. ‘Network separation’ is one example of a cyber security policy that is domain-centric. This idea conflicts against the basic philosophy of the 4th industrial revolution saying ‘all are connected to the network, and data should be actively shared and utilized’. This could also be an obstacle in order to nurture relevant industry. When we look for the balance point between the dilemma of ‘protection’ and ‘utilization’ in the era of the 4th Industrial revolution, South Korea should be able to gain its reputation as a reliable and hyper-connected state.
7. To Be Changed or to Change:
Looking Back for the Last 200 Years

3. Blockchain:
Securing Future Opportunities by Synchronizing Technology Development and the Crypto Capital Systematization

The Korean government implemented essential policies to stop speculation fever in crypto capital, which weakened the global competitiveness of the blockchain and crypto capital industry. Considering that blockchain is an inevitable trend, the government needs to set a policy goal to aggressively secure future opportunities.

In terms of global competitiveness, the government should carry out a revitalization of technology and crypto capital systematization at the same time. It is necessary to swiftly prepare for the legal status of crypto capital and find ways to proceed with taxation and accounting. Also, the government should secure the regulatory environment of "trial-first and maintenance-later" by actively allowing relevant startups to enter the regulation sandbox.

4. Startup Ecosystem:
Improving Various Regulation Innovations and Administrative Processes, Which Stops Challenges and Trial-and-error

The Startup ecosystem is the driving force of innovation and job creation. Through mergers and acquisitions, startups play an important role in terms of getting existing companies to join the 4th industrial revolution. South Korea’s startup ecosystem has matured by reaching a certain level through the constant policy implementation of opening businesses. However, some appear and disappear too soon. As an assistant for startups, the government needs to quickly review the relevant laws and regulations and suggest solutions with an administrative approach.

The government needs to implement flexible policies in order to encourage the spirit of entrepreneurship. To enhance the management capability, startups should be able to select work hours, work methods, who to hire, and types of employment. At the same time, there should be various policies to encourage repeated openings of businesses, including revivals of "losers."

Looking back for the last 200 years since the first industrial revolution, Korea was the follower who no one hardly ever paid attention to. However, Korea’s "fast follower" strategy based on efficiency had wonderful results. The Korean government designated strategic areas to support and those industries were given thanks to the powerful support of the government. This was achieved thanks to planning with future predictions and the implementation ability of the government. However, the "fast follower" strategy that led to national achievements started showing its limits. This is not only the case of industry and economy, but all areas including society, systems, and science and technology, where there is a growing number of voices of innovation and reform.

The era of the 4th industrial revolution has begun.

Compared to advanced technology, there are differences for sure, but they are not yet significant. For the first time in history, Korea is at the juncture to compete against other advanced countries at the same starting point. This is an opportunity for Korea to become the first mover. It is important for Korea to leave all the successful strategies and the myths behind. Changes always bring fear and are sometimes difficult to realize. However, Korea will be forced to be changed unless it changes by itself.

The door is about to be closed for Korea to become the first mover for the first time and the last time. Only a couple of years are left. If we were forced to be changed for the last 200 years, now it is time to change ourselves. We should become the first mover, not the follower.