

# Digital Eco-system Development Proved its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)



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**Abstract:** The study of “Digital Eco-system Development Proved Its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)” has its objectives under the context of COVID-19 pandemic and technology disruption as follow; 1) to study the scenario of digital eco-system development of Singapore and South Korea; 2) to study the government's policy of Singapore and South Korea in its digital eco-system development; and 3) to propose the best Practices of digital eco-system development of Singapore and South Korea for further development in other countries. The qualitative research with document study and e-interview among 25 key informants from all of the relevant stakeholders: the policy, the private sector, and the marginal workers. Narrative description was used. Findings found Best Practices of digital eco-system development from both countries which aligned with most of the findings such as the Boston Consulting Group (2020) and others could be applied in other countries as follow; 1) The strong leadership and concrete and achievable vision from top management of both countries. Holistic, inclusive and sustainable development is the dominant flagship of both countries : The Skill Future of Singapore, and the Digital New Deal of South Korea; 2) The Partnership model with integrated strategy under the Win& Win Principle with clear innovation goals at all levels: “the Skills Future of Singapore” from Engineer Good Program to the last mile people in the Touch Community Services; and the 1) the Meister High schools 2) the Digital Upskill by each own company; 3) the Tax Credit, Tax Incentive measures; 4) the Training Levy Grant system; and 5) the SME Training Consortiums of South Korea. 3) The broad perspective and agile way of working. According to a study by Boston Consulting Group, effective 'Agile leadership' was found to have an impact on all the successful digital transformation projects. Leaders must manage change with a broader mindset and apply agile behavior broadly across the eco-system: Asia's Silicon Valley” with its fully back up mission of “A Smart Nation”; and the “Korean New Deal” with its futuristic of digital eco-system as its national eco-system composed of its main Digital New Deal composed of the Green New Deal and the Human New Deal overarching social safety net, climate change and economic growth under the sustainable and inclusive development.

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**Keywords:** digital eco-system, technology disruption, Covid19 pandemic, Asia's Silicon Valley, Global ICT Power House

## I. INTRODUCTION

Digital transformation is not just about innovative digital technologies, it needs the eco-system which human being and other environment are also the key players. Besides, it is not just short period of time, it must be sustained over a long period of time to sustain the overall eco-system too. Especially, the current digital transformation accelerated by COVID-19 which is sweeping the world, has provided an opportunity for non-face-to-face culture to settle in our daily lives.

**“Success must be centered on 'people' and its eco-system”**

According to data released in 2019 by McKinsey & Company, another management consulting firm, the success rate of digital transformation in traditional industries such as oil, automobile, and pharmaceutical is only 4 to 11%, and digital infrastructure such as technology, media, and communication even in the industry, the success rate was below 26%. As such, the main cause of the low success rate of digital transformation is the 'error of overlooking people' because digital technologies are not meaningful in themselves, but only when they are used to improve processes and ways of working. Most of them failed in digital transformation because of their misunderstanding that digital transformation happens automatically as long as innovative digital technology is introduced. Yet, human as the leader of the ecosystem is the key of its digital ecology.

With all those reasons, with the tangible success of some countries of the regions : ASIA & ASEAN its profoundly success design its digital eco-system to serve all demands of their countries, regional and also the global development as its fame of “ASIA's Silicon Valley” of Singapore and “the Global ICT Power House” of South Korea under its sustainable growth among all sectors of the country including all the underserved sectors such as the low skilled worker, the informal workers, the migrant workers, the new graduated, and the ageing.



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So, this research explores the scenario of digital eco-system development of both countries; policy of digital eco-system development; and to propose the best practices of digital eco-system development for further development in other countries to be applied in each country's contextualized eco-system.

## II. LITERATURE REVIEW

Technology disruption keeps expanding and affected in most of the job areas i.e. cloud computing, big data, e-commerce and also some of a significant rise in interest for encryption, non-humanoid robots and artificial intelligence. By 2025, tasks at work by humans and machines will be equal. A significant share of companies also expects to make changes to locations, value chains, and the size of workforce due to technology. Number of jobs destroyed will be surpassed by the number of 'jobs of tomorrow' created by 2025, 85 million jobs may be displaced by a shift in the division of labor between humans and machines, while 97 million new jobs may emerge more adapted to the new division of labor between humans, machines and algorithms. Digital skills gaps continue to be high as well as some of the soft skills such as critical thinking and analysis, problem-solving, self-management such as active learning, resilience, stress tolerance and flexibility. (the Future of Jobs Report 2020).

### 1. Keys Success in Digital Disruption

Boston Consulting Group (2020), a global consulting firm, published the results of a study on the six essential factors for successful digital transformation of enterprises in October 2020.

- 1) The integrated strategy with clear innovation goals. Every company must implement some form of management strategy. The resulting strong vision and sense of purpose serve to energize the organization and motivate its members. An integrated strategy with an innovation goal combines a clear vision and the latest digital technology into the overall business strategy to secure a lasting competitive advantage.
- 2) The strong leadership from top management to middle management. While most members of an organization understand the efforts CEOs and top executives put into making large-scale change, that is not enough. For a successful digital transformation, it is necessary to actively participate in this change effort up to the middle management level.
- 3) The excellent employees. Companies that do not have the latest digital technologies tend to underestimate the skills and expertise of the people needed to drive digital transformation, and most successful companies hire the best talent with the potential to drive innovation.
- 4) The broad perspective and agile way of working. According to a study by Boston Consulting Group, effective 'Agile leadership' was found to have an impact on two out of three successful digital transformation projects. Leaders must manage change with a broader mindset and apply agile behavior broadly across the organization.
- 5) The effective monitoring of goal achievement status. Monitoring the achievement of goals is considered a simple matter, but only 2 out of 5 companies in the study performed effective monitoring. Periodic monitoring of

detailed operational or financial indicators related to strategic intentions, regular inspection of project results, and verification of data suitability is required.

6) The introduction of business-driven modular technologies and data platforms that are suitable for business purposes to support the development and expansion of digital technologies. (<http://www.m-economynews.com/mobile/article.html?no=31031>)

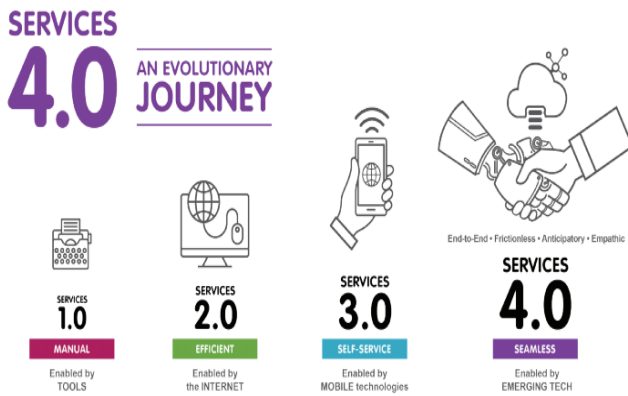
### 2.Scenario of The Digital Eco-system Development of Singapore

**2.1) Skills Future** is a national movement to provide Singaporeans with the opportunities to develop their fullest potential throughout life, regardless of their starting points. Through this movement, the skills, passion and contributions of every individual will drive Singapore's next phase of development towards an advanced economy and inclusive society. With the help of the Future Economy Council, education and training providers, employers, unions. All can own a better future with skills mastery and lifelong learning : Your skills, Your asset, Your future. Everyone is part of "Singapore's Skills Future" journey lead to opportunities to maximize one's potential and develop a mastery of skills.

- (1) Help individuals make well-informed choices in education, training and careers;
- (2) Develop an integrated high-quality system of education and training that responds to needs;
- (3) Promote employer recognition and career development based on skills and mastery;
- (4) Foster a culture that supports and celebrates lifelong learning.

### 2.2) Info -Comm Media

To ensure that Singapore stays ahead of the competition with the digitalization, IMDA constantly monitors the Info-Comm media landscape and seeks to create a globally competitive Info-Comm media ecosystem through an emphasis on talent, research, innovation and enterprise. More than a growth engine, Info-Comm Media prepares Singapore for the digital future. Singapore transformed for the better by Info-Comm media as a nation where people live meaningful and fulfilled lives enabled by technology, and where there are exciting opportunities for all. It will be a place where Info-Comm media enables a better quality of life for our people through world-class connectivity, compelling local content, and technologies to make everyday lives smoother and more convenient. It will be a living lab to entrepreneurs, growth companies and multinationals in the Info-Comm media space where they continually experiment and innovate to contribute to sustainable and quality economic growth. To support Services 4.0, the Info-Comm and Media (ICM) ecosystem will need to respond collectively to deliver solutions that are in picture 1.



**Picture 1 Services 4.0 ecosystem**

Services 4.0 is the vision response to the opportunities for the economy evolving from the era of manual services (Services 1.0) to the era of efficient, internet-enabled services (Services 2.0), then to self-services enabled by mobile, wireless and cloud technologies (Services 3.0), the next phase will be one of seamless services that are end-to-end, frictionless, empathic, and can anticipate customer needs using emerging technologies (Services 4.0). In Services 4.0 will need to meet changing customer needs quickly, innovate and create new value in order to differentiate themselves from competitors. Emerging technologies will make it possible for businesses to automate repetitive tasks and achieve higher productivity. However, as customers still demand human interactions, businesses should unlock growth by offering human-centric services enabled by emerging technologies. Both worker augmentation and automation will ultimately lead to the creation of new and enhanced jobs

### 2.3 The Five Emerging Technology Areas of Singapore

(1) Future Communications & IoT deals with wired and wireless technologies to provide the critical physical and digital supporting infrastructure necessary for the Cloud Native Architecture ecosystem. IoT includes technologies

new ways, and create value from data from all connected devices.

(2) Immersive Media & Advanced Interfaces refers to the game-changing technologies about the removal of tangible interfaces such as using gaze, gestures, voice and eventually context to be more effective by simplifying and enhancing interactions with their customers.

(3) Cyber Security refers to the foundational security technologies to addressing security and data privacy. The Cloud Native Architecture ecosystem will further fuel the trends which are reshaping the cyber security landscape globally and within Singapore ecosystem.

(4) AI & Data, and Blockchain to create more value through the intelligent systems across the entire Cloud Native Architecture ecosystem in providing superior insights, improving effectiveness and efficiency, and enhancing more value to all sides.

(5) Future-Ready Systems deal with advanced human-machine interactions such as cobots and Future-Ready Bots in a part of the Cloud Native Architecture ecosystem to enable Singapore to become a global leader in future-ready systems. (imda.gov.sg)

### III. SCENARIO OF THE DIGITAL ECO-SYSTEM DEVELOPMENT OF SOUTH KOREA

On July 14, 2020, the government announced that as a national project for economic recovery after the COVID-19; Investment and job creation by sector were presented as three pillars: the Digital New Deal, the Green New Deal, and the Strengthening of the Safety Net.

Relevant ministries and public institutions, mainly private companies, participate in the **'Data Dam' project**, which is the representative task of the government's **'Digital New Deal'**. This plan includes building data for AI learning, AI voucher and AI data processing voucher business, AI convergence project (AI+X), Cloud Flagship project, Big data platform, etc. to create jobs and stimulate the economy. It is not only effective, but also investment for the future and innovation in each field at the same time. (picture 2 -3 )

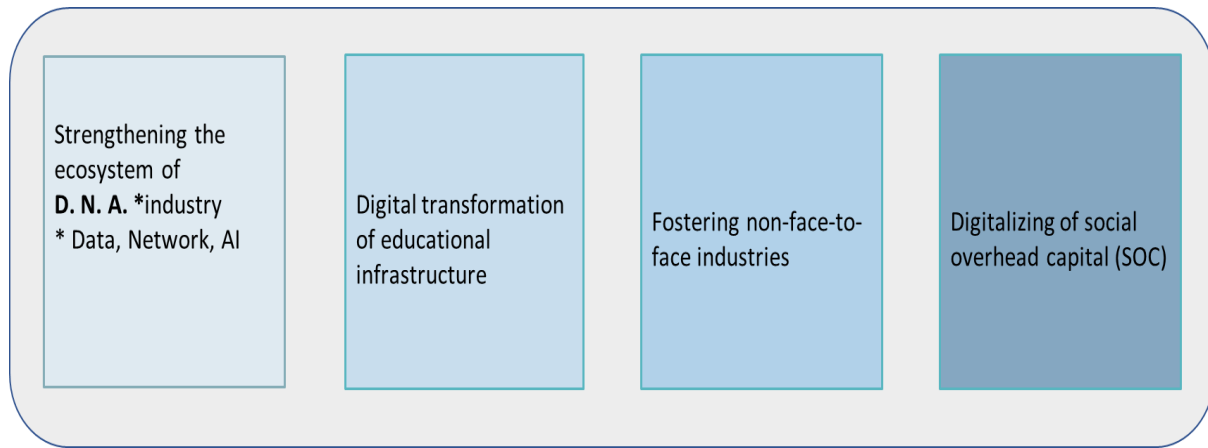


**Picture 2 Scenario of The Digital Eco-system Development of South Korea : Green New Deal**

**3.1) The 'un-tact'** (antonym for contact) life style and digital transformation of social and industrial trends as a whole due to the impact of COVID-19, July, 2020.



## Digital Eco-system Development Proved its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)



Picture 3 The “Digital New Deal” of government – Comprehensive plan with four pillars

### 3.2) Digital Competency Center – local office for Digital Divide Resolution

On June 22, 2020, the government announced the plan is to select living “Social Overhead Capital” (SOC) such as the Community Centers, libraries, and Science Centers as 'Digital Competency Centers' with 1,000 locations are selected annually, and education on train, mobile finance, e-government usage, and cyber fraud.

### 3.3) Business, Industry, Corporate responding on Digital Transformation focusing on digital skills

(1) Industry recognize the shortage of qualified manpower for digital transformation according to survey after pandemic, 71% of domestic companies attempting digital transformation (transformation) showed that less than half of their employees had digital capabilities, so strengthening digital capabilities emerged as an urgent priority;

(2) SW Maestro program : the “Creative Challenge Project Planning and Development” training course by Korea Information Industry Association.

### 3.4) Strengthening the D·N·A (Data, Network, AI) Ecosystem

(1) Establishment the data life cycle ecosystem and preparing a data control tower with big data platform;

(2) 5G mobile communication and AI convergence throughout industries such as (1) 5G convergence spread: production of immersive contents such as culture, sports, and tourism, (2) expanding the use of A.I. 'AI+x' 7 leading projects related to life, such as smart factories, home services such as indoor dust, medical image reading; (3) Promotion of digital transformation by fostering non-face-to-face startups, creating a Smart Korea Fund to support Smart Service Solutions

(3) 5Gmobile communication and AI Intelligence-based Government for rapid processing of personalized public services, customized information i.e. subsidies, pensions, promotion of blockchain-based pilot projects, network in all 39 central ministries, and cloud conversion;

(4) Establishment of K-Cyber Quarantine system to effectively respond to cyber threats.

### 3.5) Educational infrastructure digital transformation

To create an online & offline convergence learning environment for elementary, middle, high school, university, and vocational training institutions, build a digital infrastructure foundation and promote educational content expansion by creating digital-based education infrastructure in all levels with; 1) 100% wireless network in all classrooms nationwide with smart devices, 240,000

educational tablet to 1,200 leading schools, 3) build an “Online Education Integrated Platform” provides customized learning contents and Big data, and 4) K-MOOC promising courses suitable for the demand of 4IR such as A.I., robots, global famous contents

**3.6) Fostering non-face-to-face industries** by establishing non-face-to-face infrastructure in areas closely related to people's lives, such as medical care, work, and business by building Smart Medical and Care infrastructure such as the digital-based smart hospital, the expansion of remote work for SME such as online sales channels, and others.

**3.7) Digitalization of social overhead capital (SOC)** improving competitiveness in related industries through digitization of SOC infrastructure and smartization of cities, industrial complexes, logistics, etc. such as the digital management system for core infrastructure in 4 areas : 1) Transportation, 2) Digital twin, 3) Water resources, and 4) Disaster response.

**3.8) Spatial digital innovation** in cities and industrial complexes by 1) Smart City: establishment of integrated platform linked to CCTV such as traffic and crime prevention; and 2) Smart Industrial Complex with real-time safety and operations.

**3.9) Establishment of smart logistics system** such as 1) Land logistics, 2) Shipping logistics, and others. (<https://www.knewdeal.go.kr/front/view/newdeal01.do>)

## IV. RESEARCH OBJECTIVES

The study of “Digital Eco-system Development Proved Its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea) ” has its objectives under the context of COVID-19 pandemic and technology disruption as follow;

1. To study the scenario of digital eco-system development of Singapore and South Korea;
2. To study the government's policy of Singapore and South Korea in its Digital Eco-system Development;
3. To propose the Best Practices of digital eco-system development of Singapore and South Korea for further development in other countries.

## V. RESEARCH METHOD

The study of “Digital Eco-system Development Proved Its Sustainable Success under the Technology & Covid-19 Disruption: Asia’s Silicon Valley (Singapore) & Global ICT Power House (South Korea)” is a qualitative research method that involve an e-interview and desk research focused on Singapore as the “Asia’s Silicon Valley” and South Korea as the “Global ICT Power House”. The e-Interviews have been made to 25 key informants from policy, workers, private & industry sector, and the professional agencies under the disruptive technology and also the COVID-19 pandemic.

## VI. FINDINGS AND DISCUSSION

Findings from the study of “Digital Eco-system Development Proved Its Sustainable Success under the Technology & Covid-19 Disruption: Asia’s Silicon Valley (Singapore) & Global ICT Power House (South Korea)” presented under its objectives respectively : 1) the scenario of digital eco-system development of Singapore and South Korea; 2) the government’s policy of Singapore and South Korea in its Digital Eco-system Development; and 3) the proposed Best Practices of digital eco-system development of Singapore and South Korea for further development in other countries as follow;

### 1. Singapore’s scenario of digital eco-system development

**1.1) Country scenario** composed of its general information relevant to digital economy and its effects from technology disruption and COVID-19 pandemic found been ranking at the top as the world most digital competitiveness for 2019, 2020, Singapore retains as the most competitive country in Asia, including a top spot for CISCO Digital Readiness Index 2019 and the World Economic Forum’s Networked Readiness Index 2016. Despite a small population and few natural resources, businesses and residents could get access to not only one of the most technologically advanced digital infrastructure in the world but also a launched equipped

with necessary weapons and resources to stand among other nations globally.

Pandemic was in January 2020 with its performance to be the lowest case of fatality in the world at 0.06%, which is significantly lower than the WHO’s global case fatality rate of 4.34% then considered to be one of the largest and best-organized epidemic control programs in the world. Anyhow the ongoing pandemic is likely to have a significant impact on the local economy. While the policy e-Interview stated that industries that government plan to promote after pandemic are ICT, Electrical Manufacturing, Finance & Insurance since these are the cores contribute to GDP.

**1.2) Digital skills scenario :** As being the “Asia’s Silicon Valley” many IT related firms require digital skilled related workers. Other sectors are Finance and Insurance also required more IT embedded workers such as FinTech, Mobile Banking, etc. Main skill challenges exist not from the education institutions but the rapid change industries constantly. Survey acknowledge that the digital skills play the major role to determine who will get employed. Data Analyst & Scientist makes the top similar to other Asian and ASEAN countries with A.I. and Data Specialist.

Besides Singapore’ mission of being **A Smart Nation**, ICT sector is expected to be another key contributor with the ICT 150,000 workers and one-third foreigners within the area of Cyber Security, Data Analytics, and Software Development. However, there is quite a shortage of workers for Cybersecurity, Software engineers and Programmers which recently was solved by importing foreign skilled workers. Though this may make it harder for new graduates in this field which may have to compete in the recruitment with foreigners. While the e-Interview from 13 samples found all agree that digital training should start as early as the Secondary school level. Data analysis was mentioned by all the interviewees as the top field of “**Must Know**” are Digital Marketing also demanded while Programming, Coding still being a significant skills as shown in Table1.

**Table1 Top emerging Jobs analyzed by Skills-Future and the current interview 2021**

For Singapore, Data Analyst, Data Scientist, AI and Machine Learning Specialist are top emerging tech-enabled roles beneficiary need for job opportunity / better living.		
Across industries ranking Source: World Economic Forum (WEF)	Across industries ranking Source: LinkedIn	Source: e-Interview
1. <b>Data Analysts and Scientists</b>	1. <b>AI Specialist</b>	1. <b>Data Analyst, data scientist</b> , data analytics
2. <b>AI and Machine Learning Specialists</b>	2. Robotics Engineer (Software)	2. Digital marketer, digital servicer
3. Big Data Specialists	3. Full Stack Engineer	3. Microsoft Office
4. Digital Marketing and Strategy Specialists	4. Backend Developers	4. Cyber Security
5. Process Automation Specialist	5. <b>Data Scientist</b>	5. Programming or Coding
6. Business Development Professional	6. DevOps Engineer	6. <b>AI</b>
7. Digital Transformation Specialists	7. Data Engineer	7. Cloud Computing
8. Information Security Analysts	8. Cybersecurity Specialist	8. Google Analytics
9. Software and Applications Developers	9. Community Specialist	9. Robotics
10. Internet of Things Specialists	10. Partnership Specialists	10. Project Manager

## Digital Eco-system Development Proved its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)

**1.3) Digital eco-system policy scenario** found numerous programs for mid-career citizens to gain new skills. Highlighted programs include the Professional Conversion Program (PCP) by Skills Future Singapore and PCP for PMETs (Professionals, Managers, Executives, and Technicians). At the same time, the government tries to cover every digital exclusion, low-income students and low-income adults in the low-income family with the digital inclusion program such as the Engineer Good Program plus an internet access via Home Access Program (HAP). Besides, the TOUCH Community Services also provided to encourage low-income families to have close assistance in how to use applications in order to have enough confidence and efficacy to new digital literacies.

### 2. South Korea's scenario of digital eco-system development

#### 2.1) Country Scenario

Country's transformation from poverty to affluence since the Korean War has been phenomenal. South Korea became part of the Organization for Economic Cooperation and Development (OECD) in 1996. There has been no looking back since then, and today it is a fast-growing, highly industrialized nation that can serve as a Role Model for all developing nations. An important contributor to this growth process is **"the Culture of Innovation"** that prevails in a friendly atmosphere for investors and extremely cordial with most of the countries in the ASIAN market. SK is categorized as a "high-income OECD" nation by the World Bank and is largely supported by its industrial and services sector. SK has only One Track that lies ahead of it: That of Sound Growth **Be a Global Innovation Leader**.

As the World's 12th largest economy with a GDP of US\$1.459 trillion in 2010, SK has experienced huge economic growths from early 1960s to 1990s. SK faces an overqualified and underkilled labor market specifically, 42% of SK are overqualified for their jobs. At the same time, 20% of SMEs report skills shortages. Blue-collar workers without college diplomas, technicians and engineers and even vocational high school students are treated unfairly and looked down due to prejudice in society.

The key interview found sectors of ICT, automobile, as well as electronics and electrical manufacturing will become industries being promoted in the post-COVID-19 era of SK as follows; Industrial sector contributes 39.4 % of GDP in 2010. The industry and manufacturing industries are the major growth engine for SK during its economic progress in the 1980s. SK's largest industries are electronics, automobiles, telecommunication and shipbuilding. Services sub sector : ICT with its cutting-edge, its infrastructure boasting the world's fastest internet speeds, the country is home to global leading electronics motivated to keep its reputation as a Global ICT Powerhouse by investing heavily into innovative technologies such as 5G network, A.I., Cybersecurity and Big data. Semiconductors is a core industry according to the Ministry of Trade, Industry and Energy, the industry accounts for 7.8 % of GDP and makes up 17.3 % of exports (\$93b). Industrial sub sector : electronics as the World's sixth largest manufacturer of electronic goods such as color televisions, microwave ovens, radio, watches and personal computers. SK is also a major manufacturer of semiconductors. During the second half of 2019, the electronics industry generated 53,457 jobs, but recruited just 46,429 people. To help cope with a shortage, the electronics

industry was compelled to hire 5,078 people lacking skills.

Industrial sub sector : automobiles as one of world's largest automobile producers, coming in 5th after the United States and Germany, with an estimate of 4.27 million automobile produced a year. The last few decades, the government invested in industrialization, provided support for a few large firms, known as chaebols, and made significant investments in STEM education and applied R&D. It is the most automated country in the world, with 631 robots per 10,000 employees, eight times the global average. The country has high rates of STEM graduates (32%) and ranks fourth in number of patents filed. Labor force quality is considered "one of the most important drivers in Korea's economic and industrial success." However, these labor productivity may not reach an optimal level because of some reasons;

(1) **Internal challenges** that hinder beneficiary from accelerating digital skilling happening through business practices of age discriminating and hiring practices.

1) Age discrimination gap: leading companies in the country tend to have a mandatory retirement age, usually around 55, as they prefer to hire new employees than to retrain older ones, who are left to feel pressured.

"Increasingly number of challenging" 31% of SK's population will be over 65 by 2040 (versus 12.97% in 2015). About 49% of those aged 26-35 participated in vocational training, while that number drops to 18.3% for those in the over 50 groups. 72% said that it is difficult to adjust the workforce to retain older employees and 60% said that maintaining older employees increases labor costs. Only 10% of SK employees over 50 have the digital problem-solving skills needed for today's market"

2) Hiring practices gap because the companies prefer hiring contract workers, not permanent staffs, who are paid less and are easier to let go. Temporary workers are not as likely as permanent workers to go through reskilling and training programs, only learning skills that are specific to their current job.

3) High risked workers found women, informal workers, overseas migrant workers, ageing workers, youth & university graduates have been excluded from the Digital Economy in SK.

3.1) Women (50.9%) and informal workers (>60%) even of their significant roles in the healthcare sector, but many of them working outside of the healthcare sector are often more likely to lose their jobs than men. As governments scramble to bail out SME businesses, unregistered firms and informal workers within registered firms are excluded.

3.2) Overseas migrant workers currently allows migrants to fill labor shortages, but soon it may have to allow greater immigration to help augment its aging, shrinking population. There are currently 248,000 EPS (Employment Permit System) migrant workers and approximately 398,000 undocumented migrant workers.

3.3) Ageing workers (64%) make a relatively high skill gap between young and ageing workers. The skill levels of adults over 45 years of age are below international averages for the three skills domains of adult skills.



Additionally, participation in adult learning is particularly low among poorer workers. There is an important gap between generations in terms of digital skills. The OECD average, 5% of 16–24-year-olds in SK have no prior experience with computers or are unable to use a computer mouse or scroll through a web page.

3.4) Youth (10%) & University graduate found the unemployment rate of people aged 15 - 29 years old reached around 10 %, showing an increase number of unemployed among recent graduates aged between 15 - 29 totaled 1.66 million as of May, up 120,000 from 2020. Candidates for jobs graduated from a field of study that is different from the job sector in which they work.

(2) **External Forces** : COVID-19 Pandemic in SK was on 20 Jan 2020. SK was considered one of the largest and best-organized epidemic control programs in the world. Various measures, including the use of ICT to mass test the population for the virus, and isolate any infected people as well as trace and quarantine without any further lockdown. Despite these successful measures, there were several up and down in the number of new infections, though, SK has weathered the pandemic better than nearly every other advanced economy.

### 1.2) Digital eco-system skills scenario

The Korean New Deal, announced in SK on July 14, 2020 with plans to invest 160 trillion WON to create 1,901,000 jobs by 2025 based on two main policies – **The Digital New Deal** : **The Green New Deal**- and **The Human New Deal** which is an overarching policy support to strengthen employment and social safety net. This policy looks like a short that hits two birds, Climate change and Economic growth with just one stone. Around \$100 billion will come from the Korean Treasury, \$24 billion will come from Local Governments and \$20 billion will come from the Private sector.

**The Digital New Deal** provides the infrastructure that is compatible with 5G Technology, A.I., and Big Data. The government will create **A Single Digitalized Integral System (Intelligent Government)** for production distribution, management, human resources allocation, and financial administrations. The system will also help with sectors such as traffic, water resources, and disaster responses. In addition, the government aims to supply digital equipment to all Secondary schools, Daycare centers,

and over 160,000 SMEs to help them conduct daily education or business without being physically there.

The Green New Deal is to establish an eco-friendly industrial and social environment. In addition, they plan to make an Innovative Ecosystem in the 5 Leading Green Industries by selecting 100 of the top leaders in the industry.

**The Human New Deal** aims to provide emergency safety nets to the working class. The widening of the social safety net will narrow the gap between the rich and the poor. Projects under the Human New Deal will involve job training in new technologies and projects that will create jobs in new innovative sectors.

**The policy e-interview** stated that industries plan to promote especially under this disruptive technology and COVID-19 pandemic are the **D-N-A** (Data, Network and AI) related technologies and industries with a high potential for job creation based on the 4IR : data-based related industries such as AI/IOT under the Green New Deal.

The largest sector for SK economy is the manufacturing sector in Shipbuilding, Oil supertankers and other Oil drilling platform, followed by the electronics, automobiles, mining and construction. Though not ranking on the top three, SK has also earned a reputation as a **Leading Global ICT Center** in Boomborg index of most innovative nations 2020. With its cutting-edge ICT infrastructure boasting the World's fastest internet speeds, the country is Home to Global Leading Electronics and IT companies. SK is motivated to keep its reputation as a **Global ICT Powerhouse** by investing heavily into innovative technologies such as 5G Network, A.I. and Big Data.

**The workforce e-interview** : The university graduates' representatives agreed that digital training should also be provided by the business that hire the employee since they receive the direct benefit from upskilling their own employees. And also agreed that business should be the agency responsible for giving training since the business should be the one who know best what the requirement of the training. Data-related analysis or big data was mentioned by the majority of the interviewee as the field that everyone must know how to use and know how to analyze. Programming, Coding still is one of the popular courses that would like to get trained or upskilled. Results are aligned with the desk research as in table 1.

**Table 1 Top jobs in South Korea are ICT related**

For SK, 3 out of 9 top jobs are ICT related of Software Engineer, UX Designer and Web Developer, SK did not participate in the listing of World Economic Forum or LinkedIn.		
Across industries Based on Annual Salaries Source: Korean and International Recruitment Agencies (assume that emerging jobs are high paid job)	Future Work Forecast in the 4IR by Korea Employment Information Service (2017) – referred by an interviewee	Source: e-Interview
1. <b>Software Engineer</b> 66,040 USD	1. IoT Experts	1. Big Data Analysis
2. Product Manager 60,940 USD	2. AI Experts	2. AI
3. Marketing Manager 53,030 USD	3. Big Data Experts	3. Coding
4. <b>UX Designer</b> 46,450 USD	4. VR, AR Experts	4. Data Application
5. Accountant 46,290 USD	5. 3D Printing Experts	5. Digital literacy
6. Teacher 45,700 USD	6. Drone Experts	6. Digital Marketing
7. <b>Web Developer</b> 43,200 USD	7. Bio-Engineers	7. IoT
8. Nurse 34,700 USD	8. Information Security Experts	8. Blockchain
9. Architect 31,680 USD	9. Applied Software Engineers	9. VR, AR
	10. Robotic Engineers	10. Robotic

## Digital Eco-system Development Proved its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)

Table 1 reflected the demanding top jobs in South Korea are all ICT related even some of the mix up with soft skills demands starting from software engineer, UX designer, web developer, Big data analysis, A.I., Coding, and others respectively.

### 1.3) Digital eco-system policy scenario

As being the fast-growing, highly industrialized nation that can serve as a **Role Model** for all developing nations. The important contributor to this growth is **the Culture of Innovation** that prevails a friendly atmosphere for investors among other countries in the Asian market. SK has only one track that lies ahead of it: Sound Growth be a Global Innovation Leader, all the digital eco-system keep creating to achieve the committed goal. Partnership strategies from all levels both internal and international are tangible seen under its friendly ecosystem;

#### 1.3.1) Internal and international eco-system

1) The Korea Chamber of Commerce and Industry (KCCI) : KCCI's Human Resource Development (HRD) division program : providing technical and vocational skills to youth and adults to have relevant skills for employment.

KCCI has been cooperating with regional councils and industry skills councils to meet the skills needs of SMEs in the fast-changing world.

2) South Korea industrial technology promotion agency (KIAT) to efficiently and systematically promote projects to promote industrial technology innovation and to support the development of policies related to industrial technology innovation.

3) Asia Pacific Telecommunity (APT) capacity building : Training programme, Export mission in the areas of ICT, telecommunication management, mobile communication, multimedia, telecommunications and ICT policy and regulation, broadband technologies, rural telecommunication, network security, and other topics identified by members.

4) The Korea- World bank partnership facility (KWPF) the entrepreneurial talents' house of opportunities and supports (ETHOS). A gender-diverse global ICT incubation program that aims to foster and empower ICT entrepreneurs in developing countries. Table 2 Digital eco-system policy scenario in table 2.

Digital Skilling Policies – Korean New Deal to help the economic crisis during and beyond COVID-19				
No	Lead Agency	Type	Name	Description
1	Office of the President – South Korea and the Ministry of Education	Policy Transformation	Korean New Deal	Not only a way out of the economic crisis following the Pandemic but also a fast track for a nationwide digital transformation and SK's leadership in the post-COVID era. The Korean New Deal has three main pillars including, the Digital New Deal, Green New Deal to strengthening employment and the social safety nets. Through the Green New Deal, SK has an opportunity to make the post-COVID-19 economic recovery a Green One.
1.1	Office of the President – South Korea and the Ministry of Education	Policy Transformation	Digital New Deal	The government announced plans to invest 58.2 trillion WON to create of 903,000 jobs. With the aim to accelerate the transition towards a Digital Economy, investment will focus on the <b>Integration of Data, Network and AI (DNA) throughout the Economy</b> with the following objectives: <ul style="list-style-type: none"> <li>· Stronger integration of data, network and artificial intelligence.</li> <li>· Digitalization of education infrastructure.</li> <li>· Fostering the “untact” industry including supporting online activities of microbusinesses and promoting remote working among SMEs.</li> <li>· Digitalization of Social Overhead Capital (SOC) which includes adding digital innovations to urban spaces and building smart logistics and distribution systems.</li> </ul>
1.2	Office of the President – South Korea and the Ministry of Education	Policy Transformation	Green New Deal	Aims to create 659,000 jobs by 2025 by investing KRW 73.4 trillion in areas such as responses to Climate change, Green infrastructure, Renewable energy and Green industries.
1.3	Office of the President – South Korea and the Ministry of Education	Policy Transformation	Strengthening Safety Nets	Investments will be made in human resources to build talent and provide employment support for new types of jobs, and to reduce the digital gap. For example, the plan includes training 100,000 individuals on AI and software, two additional research organizations will be selected under the SK Initiative for fostering University of Research and Innovation (KIURI) and support will be provided to 40 universities to focus on software knowledge.

Digital Skilling Policies to help the economic crisis in SK during and beyond COVID-19				
No	Lead Agency	Type	Name	Description
2.	Ministry of Science and ICT (MSIT)  (Reference from e-Interview)	Training facility	Education project Strengthening Digital Skills	Its aim was to evenly distribute the benefits of digital technologies to <b>all the population in SK</b> . It set up <b>1,000 Digital Learning Facilities across the country</b> , and 428 thousand people received digital education during the 6 months of the project. Budget was set for 44 million dollars and 62 millions for subsequent year.
3.	(Reference from e-Interview)		Strengthening Digital Media Communication Skills	Aimed to form a <b>Digital Community</b> with the following 4 strategies (1) Expanding online and offline media education infrastructure (2) Strengthening digital media production skills of the population (3) Strengthening media information discernment skills, and (4) Spreading Civic Digital Attitudes, etc. Budget was set for 15 million dollars.

Table 2 Digital eco-system policy scenario





### 1.3.2) The Digital partner eco-system

The Government has created various plans to solve the problem of Skill mismatch & shortage facing all the target industries as followed; **(1) The Meister high schools.** In response to this prejudice, the government created Meister high schools, in which students can develop personal aptitudes and specialized skills in order to pursue their dreams without the need of college diplomas. The creation of the schools is part of government efforts to diversify education for teenagers. SK is known for the feverish outlook on education among parents who spend massive money on private tutoring to send their children to just a handful of top-level universities. Defined as “high schools tailored to the demands of the industrial sector”. The Meister institution focuses on supporting students in their effort to gain employment after graduation by providing a curriculum that reflects the demands of industry. practical classes jointly developed by schools and industry are at the core of the project along with hands-on experience acquired at partner companies and studying while working schemes that enable people already employed to study in colleges through a special admission system. The Meister schools chose students for technical education and apprenticeships so that they can develop expertise in fields such as shipbuilding, mechanical engineering, semiconductor manufacturing and medical equipment. Students don't pay tuition fees and are given the chance to get jobs after graduation. The government plans to gradually increase the number of the schools. Meister schools provide students with an educational environment based on achieving a Win-Win Partnership with industry. The schools establish their own curriculum, selecting fields of study according to industrial needs and potential. Throughout this process, students can continue their career development after getting a job. In addition, experts from the private sector are invited to participate in curriculum revision, in order to tailor study programs to industrial needs. At Meister schools, not only principals from industrial sectors, but also teachers who concurrently work within local industries can teach students on-site realities, something that students would not be able to access otherwise. To secure more Meister teachers, the government signed agreements with various organizations, such as the Korea Master Society and the Korea Institute of Industrial Technology.

(2) Digital upskill : companies upskill their employees to embrace digitalization and prepare them for tech-enabled roles through training grant subsidy and a hiring incentive.

(3) Using tax credit : tax credit for increasing employment - the STTCL provides for a tax incentive for increasing the number of full-time employees from the preceding year. this tax credit is applicable for increase in full-time employment until the end of the 2021 fiscal year there are other tax credit: tax credit for increase in corporate payroll, tax credit for re-hiring retired female employees of SMEs, etc.

(4) Use training levy grant system : instead of the payroll levy revenues into public training programs, the levy fund reimburses the training costs incurred by enterprises. The advantage of this system is that it encourages employers to voluntarily offer in-service training for their workers, either through in-house training programs or external training programs purchased from recognized training institutes, by rebating the enterprise's training expenses as a grant. In this way, the “Training Levy Fund” can be used to benefit enterprises that pay training levies, and training programs

can be more demand-driven to meet the needs of those enterprises.

(5) Use SME training consortiums : the SME Training Consortiums Program aimed to combat unemployment and improve the productivity of SME workers by helping groups of SMEs organize themselves to launch and manage in-service training of their workers. Each consortium formed an operating committee to manage its training tasks.

(6) In-plant training program : SMEs in general incur a higher training cost per worker compared with large enterprises, and merit compensation for their extra training costs in order to secure level playing field for fair competition.

## VII. CONCLUSION

The results from “Digital Eco-system Development Proved Its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea) ” can proposed some of its Best Practices of digital eco-system development to be applied in other countries as follow;

### 1. Singapore's scenario of digital eco-system development

With its country scenario been ranking at the top as the World most Digital Competitiveness for 2019, 2020. Being the most competitive country in Asia, and the World Economic Forum's Networked Readiness Index 2016. Despite a small population and few natural resources, businesses and residents could get access to not only one of the most technologically advanced digital infrastructure in the world but also a necessary knowledge and skills as a weapon to stand among other nations and the globe.

“Asia's Silicon Valley” has reflecting its digital skills nation dominant in Finance, and Insurance and ICT. Digital skills play the major role in driving the country as of its mission of “A Smart Nation”. Its Digital Policy reflecting its holistic and inclusive digital ecosystem development : “The Skills Future of Singapore” from “the Engineer Good Program” to the last mile people in “the TOUCH Community Services”.

### 2. South Korea's scenario of digital eco-system development

With its fast transformation from poverty to affluence and counted as a part of the Organization for Economic Cooperation and Development (OECD) in 1996 with its highly industrialized nation driven by “the Culture of Innovation” with only track as **Be a Global Innovation Leader**. Sectors of ICT, automobile, electronics and electrical manufacturing will become industries promoted in the post COVID-19.

The Korean New Deal is its futuristic of digital eco-system as its national eco-system composed of “the Digital New Deal” : “the Green New Deal” and “the Human New Deal” overarching support to strengthen employment and social safety net aligned with the climate change and economic growth under the sustainable and inclusive development.



# Digital Eco-system Development Proved its Sustainable Success under the Technology & Covid-19 Disruption: Asia's Silicon Valley (Singapore) & Global ICT Power House (South Korea)

All demands driven policies have answered such as 1) the Meister high schools tailored to the demands of the industrial sector by supporting students in their effort to gain employment after graduation by providing a curriculum that reflects the demands of industry; 2) the Digital upskill by each own company to embrace digitalization; 3) the Tax credit, Tax incentive measures; 4) the Training Levy Grant system; and 5) the SME training Consortiums.

**Conclusion** found Best Practices of digital eco-system development from both countries which aligned with most of the findings such as the Boston Consulting Group (2020) and others could be applied in other countries as follow;

1) The strong leadership and concrete and achievable vision from top management of both countries. Holistic, inclusive and sustainable development is the dominant flagship of both countries : The Skill Future of Singapore, and the Digital New Deal of South Korea;

2) The Partnership model with integrated strategy under the Win& Win Principle with clear innovation goals at all levels: "the Skills Future of Singapore" from Engineer Good Program to the last mile people in the Touch Community Services; and the 1) the Meister High schools 2) the Digital Upskill by each own company; 3) the Tax Credit, Tax Incentive measures; 4) the Training Levy Grant system; and 5) the SME Training Consortiums of South Korea.

3) The broad perspective and agile way of working. According to a study by Boston Consulting Group, effective 'Agile leadership' was found to have an impact on all the successful digital transformation projects. Leaders must manage change with a broader mindset and apply agile behavior broadly across the eco-system: **Asia's Silicon Valley** with its fully back up mission of "A Smart Nation"; and the "Korean New Deal" with its futuristic of digital eco-system as its national eco-system composed of its main "Digital New Deal" composed of "the Green New Deal" and "the Human New Deal" overarching social safety net, climate change and economic growth under the sustainable and inclusive development.

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## AUTHOR PROFILE



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She is currently being the Assoc. Professor under the Faculty of Communication, Sukhothai Thammathirat Open University, Bangkok, Thailand. Also being the Director of the Expertise Centre : CCDKM (Research Centre of Communication and Development Knowledge Management : [www.CCDKM.org](http://www.CCDKM.org)). She just finished her term as the Chair of the APTN (Asia Pacific Telecentre Network: 2012- mid 2016).

Her focus is the Development Communication especially in the Community-based Communication by her previous 13 years in Kasetsart (Agriculture) University. Media especially the ICT 4 D (ICT for Development) her focusing is ICT4 D for all marginal ones both local till global. She has been dedicated her life to empower marginalized communities in Thailand and disadvantaged groups through Communication and ICT such as ICT and Sustainable Agriculture/ Smart farmer, Women and Technology, ICT and disability, e-Commerce, Online Learning, Web Development, social media for development, among others.

### Her Current International Recognized Awards:

2012 : Outstanding Alumni of AFA (Asia Fellow Association)

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2015 : the GEM-TECH Awards 2015 Category: Application of Technology for Women's Empowerment by UN Women & ITU

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### Her Educational Background :

1) B.A. (Mass Communication), 1982

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