

Promotion of Technology-based Start-ups: TIPS Policy of Korea

Jung-wha Han*

Abstract The key conditions for the promotion of innovative technology-based start-ups are expanding the market for innovative technology products and services, increasing equity-based funding opportunities, promoting the commercialization of technological innovation, and establishing a fair-trade system for start-ups to compete fairly in the market. Besides, there is a need for a support system that minimizes the cost of failure in case of business failure to facilitate re-challenge and provides education and training opportunities to enhance entrepreneurial capabilities. To activate technology-based start-ups, the Korean government introduced the TIPS policy in 2013. It is a program that creates technology start-up with private investment led by successful venture entrepreneurs, which has shown remarkable achievement and is regarded as the most successful policy in this field up to now. The most critical factor contributed to the success of this program is to invite private investors to select a technology entrepreneurship team and provide mentoring with the investment. The government provides R&D funding with matching investment, commercialization and marketing support to ensure that technology start-ups survive crossing the death-valley. Subsequent investments from domestic and abroad investors are actively made and it is becoming a representative technology-based start-up program in Korea.

Keywords TIPS, technology-based start-up, fair trade system, commercialization of technology, re-challenge, entrepreneurial university

I. Introduction

In the book, ‘Competitive Advantage of Nations (1990)’, author Michael Porter presented a model for the nation's economic development from a labor-driven stage to a capital-driven stage and then to an innovation-driven stage. Based on this model, Korea adopted a light industry-oriented development strategy in the labor-driven economic stage of the 1960s and actively pursued the export market to overcome the limitations of the narrow domestic market. Entering the heavy chemical industry in the mid-70s, capital investment was

Submitted, December 10, 2019; Accepted, December 24, 2019

* Distinguished Professor, Hanyang University; Former Minister of Small and Medium Enterprises of Korea; hanjh@hanyang.ac.kr



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

increased, and aggressive foreign capital was induced to overcome the limitations of domestic financing. In the mid-80s, the Start-up Support Act (1986) was enacted to foster technology-intensive SMEs and promoted the establishment of private venture capital. However, the lack of infrastructure to support technology-based start-up has made it difficult to achieve desirable results.

In 1997, the Korean economy faced a crisis of national bankruptcy caused by the foreign exchange crisis and made a lot of efforts to overcome a severe economic recession happened as a result. To resolve this problem, the government under President Kim Dae-Jung strongly promoted the venture business activation policy, resulting in the creation of many technology-based start-ups in the short term. Combined with the global Internet start-up boom, a massive number of start-ups contributed to the vitalization of the Korean economy. As the Internet bubble collapses in the early 2000, Korea's venture boom also collapsed. Since then, the government has exercised a variety of measures to revitalize the creation of technology-based start-ups but did not realize significant results. In the 2010s, however, many start-ups began to appear in the field of IT, new materials, and bio-medical, along with app-based start-ups, particularly due to the popularization of smart phones.

In 2013, as launching of the President Park Geun-Hye government, in pursuit of creative economy policy, technology-based entrepreneurship was actively promoted. The most focused policy is the Tech-incubator Program for Start-up (TIPS), that is designed to activate the innovative technology-based start-up through investing and mentoring of venture firms with transferring of success experience of the established venture companies. TIPS has been actively implemented for the past seven years and come up with a lot of success cases.

This study discusses the conditions to promote the creation of technology-based start-ups focusing on the vitalization of innovation ecosystem and to examine the government's policy experience executed successfully. Among them, I would like to introduce the case of TIPS as a core policy base on my own experience because this program was designed and implemented by the author worked as administrator of the Korean Small and Medium Business Administration from March 2013 to January 2016.

II. Korean Start-up Policy

The start-up policy in Korea began with the enactment of the Start-up Support Act in 1986 and the establishment of private venture capital. This policy was designed to expand the funding opportunities for start-up companies based on investment rather than loans. In the early 1990s, more than 50 venture capitals

were established to provide investment support to technology-based start-ups. Contrary to expectations, the start-up investment market was depressed due to sluggish investment in start-up companies and poor performance of venture capital. The main reason for the depression was the lack of an exit market to liquidate invested funds. In 1996, to solve this problem, the government established KOSDAQ, an IPO market for technology investment funds. Besides, in 1997, 'The Act on Special Measures for the Promotion of Venture Businesses' was enacted. This policy contributed to revitalizing technology-based start-ups by gaining strong momentum in the economic downturn caused by the Korean currency crisis.

Based on this historical background, the most important issue of Korea's entrepreneurship policy is to create an investment-based entrepreneurship ecosystem rather than loan-based. To this end, the founding capital requirements of start-up investment companies were relaxed to facilitate new entry. In 2018, new venture investments amounted to 3.1 billion USD, a 43.9% increase compared to 2017, marking the largest amount since the establishment of private venture capitals in Korea. In particular, the bio-medical and ICT sectors accounted for 50.7 percent of the total investment in 2018. Angel investments reached 540 million USD, up 70.2 % from a year earlier. The investment attraction of domestic start-ups is estimated at 74 billion USD in 2018. While venture investment and angel investment are steadily expanding, investment in early start-ups is still insufficient. It is necessary to establish an investment system responding to the growth stage by expanding the supply of investment such as accelerator and crowd funding. The Venture Investment Promotion Act is being enacted to ease regulations on investment and to integrate investment systems, which is now divided into the Start-up Act and the Venture Business Promotion Act.

In 2018, the Korean government arranged a plan to provide 9 billion USD for the promotion of innovation and venture growth, aiming to facilitate the creation of start-ups and funding linked to the stage of growth. The government has created and operated various liquidation funds, including M&A funds and secondary funds, which are targeted at acquiring equity from start-up companies. More aggressive investment such as angel investment and crowd funding is encouraged in the early stage of start-up companies by providing tax incentives through expanding the amount of income deduction. As of 2019, more than 200 accelerators are in operation since the introduction of the accelerator promotion act, which was made to promote mentoring and investing for start-ups. In 2018, 10,210 promising technology founders were produced through a 'customized technology start-up platform'. Since the implementation of the TIPS policy, 657 technology-based start-up teams were established by the end of 2018.

Another important task of entrepreneurship policy is to promote the scale-up of start-ups. 'The Act on Special Measures for the Promotion of Venture

Businesses' is being revised to delegate the authority of verification of venture business from the government to the private institutes. The government is seeking to revise a law that will ease restrictions on R&D-focused start-ups' participation in the government procurement market by eliminating their obligations for direct production of start-ups.

Besides, the government agencies including Small Business Corporation, Credit Guarantee Fund, and Technology Guarantee Fund abolished the practice of joint liability on guarantee of the loan from policy financial institutions to ease the burden of start-up founders in case of business failure. It is also expanding and running the packaged program including education, mentoring, and funding for commercialization of technology to support the entrepreneurs who are in the process of re-challenge after experiencing business failure. As a result, the survival rate of start-up companies with policy support increased. The survival rate of South Korean start-ups is 28.5 percent, which means that seven out of ten start-ups disappear within five years. Entrepreneurs receiving policy support have a 20 percent higher survival rate than start-ups without support, and the 5-year survival rate is 1.9 times higher.

Although the performance of policies to promote technology-based start-up is indeed improving in terms of quantity, it is still weak in terms of quality; especially the success cases with global competitiveness are still few. The biggest reason is that there is a lack of incentives for high caliber engineers and scientists to participate in the start-up game and the efforts for taking risk is not properly rewarded. In other words, the potential for compensation is insufficient compared to the risk of failure. In general, innovative technology-based start-ups experience a death-valley between three and five years after their inception. Funds are easily exhausted during technology and product development, but the level of revenue above the break-even point is not realized. Due to the limited size of the domestic market, it is often faced with the slow down of sales growth. For sustainable growth, it is necessary to develop overseas markets, which is attractive but risky and costly. Also, when the market grows to a certain extent, the large companies enter the market and give great pressure of competition to start-ups, and confrontation and conflicts between them and SMEs occur as they scout the core technical personnel of SMEs.

The reason why excellent professionals do not start a business in Korea is that the cost of business failure is too high for an individual to find the way of recovery due to many institutional hurdles such as joint liability on guarantee for start-up founders and high penalty on tax delinquency resulted from business failure. In an environment where a business failure is considered a life failure, it is difficult to expect for high potential professionals to challenge a start-up business. In the report of the Hyundai Economic Research Institute (October 23, 2013), 52 percent of respondents answered that "If their children want to do a start-up, I will hold them back", and 92 percent said, "If my business fails, I

would end up being a delinquent borrower." Despite the numerous policy supports, the negative perception of a start-up is widespread because the social learning effect on the negative consequence of business failure is accumulated.

Even in the international comparison of entrepreneurship index, Korea is in low position. The reason is that "the fear of failure and the personal cost in case of failure are high". In particular, several unfavorable constraints have hampered the intention of start-ups. In Korea, the opportunity for equity-based start-up financing is limited and dependency on loan-based financing is high. Because of insolvency problems, entrepreneurs easily face a situation that leads to credit delinquency caused by business failure. Moreover, Korea's re-challenge support policy was insufficient compared to the start-up support policy. As a result, a 'founder takes all risk' ecosystem has been formed, in which business failures are regarded as individual faults and the cost of failure must be taken by the individual. This is why young people are reluctant to create their businesses.

In 2011, the Korea Venture Business Association conducted a survey, asking a question for 100 venture businessmen and experts, "Why are there no entrepreneurs like Mark Zuckerberg, the founder of Facebook, in Korea?" The majority answer was "absence of social tolerance on failure" and "absence of re-challenge system". The America has the most innovative entrepreneurs and technology-based start-ups in the world because of many opportunities for re-challenge after failure. In order to revitalize the re-challenge ecosystem in Korean society, the following aspects need to be solved: how to reduce the chances of failure after starting a business, how to effectively respond to the sign of failure, how to minimize the cost of closing a business, how to minimize personal sacrifice to save the momentum of another challenge.

III. The Necessity for Vitalization of Technology-based Start-up

For the past two decades, Korea has been successful in making the technology-based start-ups in terms of number through implementing various entrepreneurship and start-up policies. At this point, however, it is necessary to evaluate the impact of technology-based start-ups on society in terms of quality. Also, it is necessary to increase the effectiveness of policies to make Korea an innovation-driven economy. The necessity of activating technology start-ups is followed.

First, to secure the techno-hegemony of the developed countries and competitive advantage at the enterprise-level and the national-level in the age of 4th Industrial Revolution. The Korean economy has become the world's 11th largest in 2018 since industrialization started in the 1960s. In terms of physical achievement, it is a remarkable success, but it is now facing many challenges.

Korea has maintained a high level of competitiveness in the global market with its export-driven growth and its industrial portfolio of semiconductors, automobiles, shipbuilding, steel, petrochemicals, mobile phones, and displays, etc. However, most of these sectors are in global oversupply, and South Korea's position has been rapidly weakened, especially by China's aggressive investment.

In Korea, it is urgent to create future growth engines of the economy through fostering technology-based start-ups in the convergence of ICT and manufacturing using data technology. Related to the servitization of manufacturing and digital transformation of the existing business, the creation of high value-added start-ups should be created. However, the challenge to start-up by high potential professionals is not fully activated enough to accelerate future growth. To solve this problem, it is necessary to promote a 'high-quality start-up' that can lead to the 4th industrial revolution through the effective advancement of the start-up ecosystem. At this time of the "window of opportunity" of technological start-ups, it is urgent to encourage the engineers and scientists to create and participate in start-up game.

Second, technology start-ups are highly likely to survive through accumulating sustainable competitive advantage. Technology-based start-ups have high uncertainties and risks, high initial barriers to entry, and high initial survival difficulties. After overcoming these limitations, however, there is a high chance of a leap with sustainable survival by establishing differentiated competitive advantages. This is because of the "accumulation effect" of technological core competencies. In general, one of the many reasons why there is a high failure rate of start-ups is that the companies do not have a sustainable competitive advantage to protect themselves from an attack of imitators or challengers.

Failure to acquire critical mass customers is a threat to survival. If the company enters the market as a starter, it is likely to enjoy the first mover's advantage. But if the latecomer enters the market with more innovative technologies and strategies, it is difficult to maintain its competitive advantage. Therefore, the first mover must achieve differentiated resources and capabilities unique within the company before the coming of catch-up threat by the latecomer. Most technology-based start-ups enter the market targeting niche markets and continue to build capacity while gaining a competitive advantage in the market. To survive, securing the customer base is critical, and then through an accumulation of some years, the company has a chance to pass an inflection point for growth.

Third, the technology-based start-ups provide "decent jobs" through realizing growth in scale and high value-added. The diversification of customers along with the cumulative effect of technology increases the bargaining power in pricing. At present, the biggest problem of Korean SMEs is the wage gap

between large and SMEs. The way to overcome this problem is to increase the bargaining power of the company and to foster the legal system of fair trade by the government. Enhancing technological capability and diversifying customer lines are the most effective means to increase value-added. In Korea, excessive dependence on self-employment should be reduced through the vitalization of technology-based start-ups. In general, countries with low-income levels have a high dependence on necessity-driven start-ups for livelihoods, but, as the level of income increases, the portion of necessity-driven start-ups decreases, and opportunity-driven start-ups increase. However, although Korea's per capita income is over 30 thousand USD, employment by the micro business is still the highest among OECD countries. To resolve excessive dependence on self-employment based on micro business, it is necessary to create high-quality technology start-ups and to provide decent jobs by growing SMEs.

Fourth, it is necessary for the Korean economy, particularly SMEs, to survive in the competition with China. In the industry sectors based on economies of scale and cost competitiveness, Korea has faced difficult situations in coping with the aggressive expansion of Chinese companies which receive massive subsidies from the government under the system of state capitalism. In such industries as steel, shipbuilding, display, and cell phones, Korea have been losing its competitive advantage against China. In almost all areas, the technology gap with China has been narrowed and, in such areas of the electric car, drone, AI, fintech, China is even going ahead of Korea. Moreover, over the recent deployment of THAAD (Terminal High Altitude Area Defense) in the Korean peninsula, China is pressing Korea by utilizing its economic power as a strategic weapon. In this situation, technological competitiveness should be used as a weapon to increase the chances of survival and growth in Korea. Israel's strategy of securing survival with advanced technologies in a hostile environment is a good reference to Korea.

IV. Conditions of the Ecosystem for Vitalization of Technology-based Start-ups

1. Market Expansion

The first condition for the activation of technology start-ups is market expansion. The existence of potential demand for innovative technology-based products or services is a critical factor in promoting technology start-ups. Although the size of the domestic market varies from country to country, the United States is the largest market for innovative products and China's domestic market is also growing fast. Most other countries must actively pursue overseas

markets due to the limited domestic demand. Targeting the export market, various policy supports are needed because there are many barriers for technology start-ups to enter the foreign market. The Korean government has supported the overseas marketing of start-ups through government agencies such as KOTRA and the Small Business Corporation. The most popular measure is package support, which combines consulting, export R&D, and marketing support. It has proved most effective to provide customized package support based on the evaluation of the potential capability of exporting.

To expand the market, it is necessary to actively use public procurement policy. To do this, utilizing more aggressively the current preferential purchasing policy of the new technology products is required. Evaluating new products and services by the expert committee is needed to reduce the burden on the procurement agency. If not, the agency of public procurement tends to be passive in purchasing new technology products due to concerns of personal responsibility. Besides, if start-ups succeed in developing the technology to a certain level according to the contract predetermined by purchasing agency, it is necessary to give the mandatory fulfilment of the contract to purchase a certain amount of products or services for a certain period of time. Entering overseas markets with the partnership between large corporations and SMEs should be expanded as well. The public procurement should be actively utilized as effective means for start-ups, as a reference of credit, to enter overseas markets because the track record of participating in the public procurement market gives confidence to overseas buyers.

The market expansion for innovative technology products through regulatory reformation is necessary. Korea currently has limited access to start-up markets, like telemedicine, drone, blockchain, car sharing, and accommodation sharing are regulated. In Korea, the Airbnb and Uber-like businesses are currently illegal. The law of protection of privacy also binds the big data industry. The issue of conflict of interest between stakeholders should be adjusted to support market activation through appropriate legislation. To enable start-ups in these areas, the regulatory approach should be changed from positive to negative to allow anything that is not specified by the law.

Market support for technology-based innovative products is necessary. Through policy support, it is necessary to establish a contact point with initial customers and to enter the mass market or overseas market based on this. Since overseas buyers want products that have proven their quality in the domestic market, if start-ups have the opportunities of test marketing in public procurement market and take advantage of policy support for export marketing, the chances of success in the overseas market will be greater. It is necessary to increase the overseas expansion budget, support organization, and enhance the effectiveness of the support method to activate the overseas marketing of

technology-based start-ups. Expansion of emerging markets with high growth potential and actively utilizing new export channels such as online are necessary.

Also, the government must establish the priority purchase system for high-tech products and support the conditional procurement of new products and services. Such a system has indeed contributed to the development of demand for technology-based start-ups. However, the performance of conditional procurement based on technology development is not good due to the passive attitude of public institutions. The government needs to force the procurement agency to be more favorable to purchase of products and services based on technological innovation.

2. Investment Increase

To promote technology start-ups, various forms of investment such as angel investors, crowd funding, venture capitals, and accelerators should be activated. For the promotion of angel investment, tax support needs to provide not only for individual angel investment but also for corporate angel investment. Moreover, the government should expand the range of income deductions and expand the scope of business sectors subject to investment, and increase the number of secondary funds specialized for angel investors. The cases of serial entrepreneurs who take 2nd and 3rd challenges through successful exit within a relatively short period should be increased. To encourage investment, divestment channels should be diversified. Toward this end, it is necessary to increase the corporate tax deduction rate from the current 10 percent to 20 percent for the purchaser of the company in case of M&A. Since the main purpose of taking over technology-based start-ups is to acquire the technology, it is required to grant the tax incentives equivalent to that for R&D investment. The transfer tax rate of major shareholders in the case of divestment should be gradually reduced. To encourage reinvestment, the current obligatory requirement of 80 percent for tax reduction should be relaxed to 50 percent.

Independence of KOSDAQ should be secured to revitalize the IPO exit market. Not just part of the stock exchange market, a position as a specialized market for stock trading of technology-based start-ups should be established. Besides, regulations on crowd funding need to be eased. It is necessary to abolish the annual cumulative limit for the same company and the resale prohibition for one year after purchase and to simplify the deposition procedure. Moreover, deregulation and policy support for corporate venture investment is needed. The requirements for the overseas investment of venture capital should be eased to facilitate venture capital's entry into the global market. The dual voting rights system of venture companies should be introduced to provide conditions for the

fund to be financed while minimizing the dilution of share held by the founder of start-ups.

Private investment should be the driving force of developing a start-up ecosystem. The government has been implementing various policies to do this and has recently shown positive results. To promote equity-based financing rather than loan-based for start-ups, the virtuous cycle of investment, divestment, and reinvestment should be further accelerated. Furthermore, policy to increase venture investment should be pursued in the direction of expanding the inflow of private funds into the investment market, reducing the portion of public investors, and strengthening the cooperation with overseas investors to enter the global market.

The government established overseas offices of Korean venture investment in the United States, China, and Singapore to globalize the venture investment market. During the past two years, it has attracted about 41 million USD in foreign capital to form a fund worth about 710 million USD operated by overseas venture capital firms. Some of the domestic companies that received investment through these funds were able to receive follow-up investments from overseas venture capital firms. When venture firms receive investments from venture capital firms with overseas networks, they have the opportunity to raise funds and accelerate their overseas expansion. In this sense, the direct foreign investment by domestic venture capitals needs to be encouraged more favorably because having an overseas financing network is essential for start-ups to expand its business operations in the global market.

3. Support for Commercialization of Technology

To promote the commercialization of technological innovation, technology-based start-ups should be activated and make more cases of success in the market. The success rate of R&D support by the government demonstrates more than 90 %, while its commercialization performance is only half that of 40%. Such poor performance resulted from the lack of capabilities of commercialization by start-ups. However, more fundamental problem is the weak support system in the process of commercialization. Looking into the cases of the countries with a high probability of success in technology commercialization, the universities have the experts to help start-ups commercialize technologies in its industrial-academic cooperation or start-up support groups. Moreover, its funding support is effective through connection with outside investment funds.

The U.S. has already developed a support system to commercialize the technologies developed in universities with strong engineering schools more than 40 years ago. The university itself has been developed into an

entrepreneurial university, beyond a research-oriented university. For the past decade, the University of Oxford has become a renowned entrepreneurial university while keeping about 80 professionals in the university innovation corps, and with their support, the most active technology-based start-ups have been created. Tsinghua University or Peking University in China has also actively promoted the commercialization of technologies developed in the university's laboratory by establishing technology holding companies. Tokyo University and Kyoto University, which have been conservative national universities in Japan, have established investment companies to support technological commercialization, realizing many successful achievements. In Singapore, Nanyang Technical University and Singapore National University competitively promote the commercialization of technologies developed in the campus.

Korea also has a system to support technology-based start-ups in the universities and has promoted the commercialization of technology developed in the laboratory by establishing technology holding companies. However, the performance of technology commercialization has not yet been successful. The government should actively support the transformation of the university into a more entrepreneurial institution so that it can serve as a hub for technology-based start-ups. In the era of technology initiative competition among developed countries, intellectual property war, and the 4th industrial revolution, more active roles of universities are needed to promote entrepreneurship and commercialization of technology in universities. First of all, an effective support system for faculty and researchers to launch the technology-based start-ups should be established. Recently, many universities actively pursue to be TIPS operators, providing more opportunities for professors and researchers. Forming of alumni angel fund is helpful for start-up financing in the universities.

The evaluation system for professors should be changed to give incentives for the commercialization of technologies. Graduate students should also be allowed to participate according to the professor's professional track so that students interested in starting a business can choose a laboratory relevant to their career goals. In cooperation with companies, the opportunities to commercialize the outcomes of technological innovation should be expanded. To promote the technology commercialization of universities, it is necessary to create and expand start-up funds for universities. Such universities as Tsinghua University, Peking University, and Tokyo University have established investment funds to support start-ups of universities. Seoul National University, KAIST, Postech, and Hanyang University in Korea recently established start-up funds. In this way, the government needs to provide support for universities with outstanding performance in science and engineering to transform into entrepreneurial universities.

4. Establishing a Fair-Trade System

For technology-based start-ups to be active, it must be possible to prevent unjust exploitation of technological outcomes in the market by the large corporations. There are many cases of companies that are in a management crisis or even going bankrupt due to the illegal capture of core technology even they succeed in the commercialization of technological innovation. In some cases, employees take out the technology of the firm and hand it over to competitors and large companies force SMEs to disclose the technical data as sub-contractor for providing them to third parties. Some large corporations scout the key engineers from SMEs to obtain the trade secret. Besides, there are many cases in which large companies are not willing to compensate for the patents achieved by SMEs or, when claiming the right of patents, invalidate them through litigation. In such cases mentioned above, the start-ups have a risk of losing their competitiveness and facing the crisis of business failure.

In 2011, a punitive damage act was introduced to prevent these problems. In reality, it is difficult for SMEs to solve problems through litigation against large corporations. SMEs whose technologies were unfairly exploited are not likely to win when they file a lawsuit against a large company, especially for start-ups with insufficient capital reserved within the company. As illegal technology takeover is widespread in the market, the value of technological innovation or patents is not fairly evaluated in the market, working as an obstacle to the vitalization of M&A.

As unfair practices have spread in the market, the performance and wage gap between the large corporations and SMEs have widened, which causes the dual structure of wages in Korean society. As the perception that SMEs are inferior and vulnerable in terms of compensation and security has become more solidified, there has been a tendency of avoiding SMEs as a job opportunity. As a result, entrepreneurship is deteriorated, which in turn weakens social dynamics and hinders economic development. Therefore, priority should be given to establishing fair competition in the market. To do this, first of all, the institutional reform should be done so that the Fair-Trade Commission (FTC) can play its role.

First of all, strong enforcement of punitive damages is necessary. This system was introduced to resolve unfair trade arising from subcontracting transactions. Penalty for punitive remedy is tripled to the injured beneficiaries when the prime contractor illegally uses the subcontractor's technology, reduces unfairly the price of contracting, cancels orders without due process. It is a system that compensates for damages through litigation within the scope up to the triple. The introduction of punitive remedy can also help SMEs recover from the damages, as the amount of compensation is directly delivered to the party

affected by unfair trade practices. To improve the effectiveness of the punitive reparation system, it is necessary to support measures to prevent retaliation and the legal response capacity of SMEs.

Independence and status of the FTC should be enhanced. Toward this end, experts from the SME field should be included in the formation of a committee of the FTC, which is in charge of deliberating and deciding cases. Effective punishment for large corporations for their illegal practice prevents the recurrence of similar practices. It should also be devised by granting the FTC the right to investigate unfair practices such as abuse of power by a market-dominant firm. The government should strengthen the level of penalty for violations of the Fair-Trade Act to enhance the effectiveness of prevention from unfair trade practices and retaliatory measures. Since it is difficult to change the practice of unfair trade with a monetary penalty as it is now, the CEO's responsibility for illegal practice should be strengthened according to the accumulation of penalty points.

If a start-up company is required to take the burden of proof regarding damage, it is difficult to resolve the case of dispute caused by unfair practice. Therefore, the burden of proof needs to be transferred from the sufferer to the offender in determining whether there is any damage or not. In this regard, it is necessary to strengthen the legal system to resolve the case. The counselling system should be activated to enhance the effectiveness of legal support for SMEs who are lacking the legal capacity to cope with unfair practices in the market. It is necessary to strengthen the role of reporting unfair trade and expand services of linking outside legal advisor. Administrative reforms such as the FTC's swift handling of cases, transparent disclosure of information, and introduction of practical measures to recover damage are needed.

The FTC need to reinforce its authority to introduce the right to investigate cases by force, fast-track system to deal with cases swiftly in case of reporting, compensation for actual damage, and funding to rescue victims. Protection for victims affected by unfair trade should be strengthened. It should also change the FTC's privilege that did not allow dissenting proceedings against the ruling due to its exclusive right to file complaints. First of all, the right to request mandatory accuse should be changed to the right to accuse, and the Ministry of SMEs and Start-ups should have the right to investigate along with the right to accuse, and the budget and manpower should be allocated accordingly.

5. Reduction of Failure Cost

To reduce the cost of failure and promote re-challenge, first of all, revision of a joint guarantee liability system is necessary. One of the reasons why entrepreneurs facing business failures have difficulty to decrease personal cost

is the practice of requiring a guarantee of paying back the debt of the firm by the CEO or primary shareholder. As a result, it has become a major factor that makes it difficult to re-challenge by raising the tangible and intangible cost that individuals must bear in case of business failure. Because of the moral hazard of the entrepreneurs in case of default, strict legal and financial obligation has been imposed on CEO and primary shareholder to enhance the practice of responsible management. However, in the case of business failure, the corporate debt is passed on to the guarantor, causing the entrepreneurs to fall into a bad credit or damage to those around them. To solve this problem, it is necessary to spread the measures to exempt joint liability on guarantee if the start-up founder meets certain requirements. Currently policy funds such as the Credit Guarantee Fund, the Technology Guarantee Fund, and the Small Business Corporation, recently abolished the practice of joint guarantee liability but private financial institutions still maintain the practice.

Second, the policy of expanding the scope of debt relief should be actively implemented. Even though the government's policy provides support for re-challenge, there are many cases where the debt of the past becomes an obstacle for the entrepreneur to launch business again. There are cases that fund by policy support is used to clean up the past debt instead of utilizing for re-challenge. To solve this problem, a policy was introduced in 2015 to increase the debt reduction rate of policy loans up to 75% and loan of private financial institutions up to 50%. A policy was introduced to allow outstanding debts to be repaid in instalment. To facilitate the implementation of this system, the "Evaluation of Integrity Management System" was introduced based on the legislation of the act. It is a system for evaluating whether a re-challenger has been operating sincerely without window dressing, intentional misconduct, and unfair dismissal. To make re-challenge for entrepreneurs of experiencing business failure successful, it must spread the perception that re-challenge is possible through government support if the guidelines of integrity management are observed.

Third, the stigma effect should be eliminated. Financial institutions identify credit recovery information as bad credit information, and credit information agencies keep the blacklist of business failure even after the obligatory release of information to the public. To reduce the stigma effect, Credit Guarantee Fund and Technology Guarantee Fund allowed the issuance of a warranty any time after the recovery of credit. Even though there is a default of tax payment, entrepreneurs applying re-challenge are allowed to get the loan if they submit a reimbursement plan for tax delinquency. The government needs to restrict the sharing of credit information and support the rapid recovery of credit rating. Shortly, a policy should be implemented to restrict the early deletion of bad credit information for businessmen in re-challenge. The restrictions on participation in government projects and policy supports, such as R&D and public procurement should be eliminated. It is also necessary to delete credit

information for the entrepreneurs who failed for the first time and had no serious managerial misconduct and faithfully implement credit recovery procedures.

Fourth, the burden of tax debt on businessmen in re-challenge should be eased. Tax liabilities are incurred in the process of business failure are not exempt from credit recovery, rehabilitation, and bankruptcy. To reduce the tax burden for failed businessmen, Korea Tax Collection Act gives a grace period of tax payment. However, the problem is that the interest rate for delinquent tax is too high for the failed businessman to pay back within a limited period. In conjunction with the break-even period for companies in re-challenge, installed tax payments should be extended to four years. It is also necessary to ease the burden of the penalty with a high-interest rate by lowering to the level of commercial rate or below.

Fifth, to make the re-challenge ecosystem more effective, it is required to train experts in corporate rehabilitation and turn around management. The simplified revival system was introduced through the revision of the Act on Debt Rehabilitation and Bankruptcy to help SMEs with a debt of 27 million USD or less, most of the entrepreneurs are not familiar with the change of the law and not active in utilizing it. As a result, the companies eligible for rehabilitation support miss the timing for application and do not escape from trouble of bankruptcy. To realize the purpose of the simplified rehabilitation system practically, it is necessary to expand public relations and establish a more effective system, and strengthen the manpower through extensive involvement by professionals such as accountants and lawyers with expertise in corporate restructuring and credit recovery.

6. Enhancement of Entrepreneurial Capability

Promoting technology-based start-ups requires strengthening entrepreneurship education and training programs for cultivating potential entrepreneurs. The effectiveness of incubating and mentoring should be enhanced for companies in the process of starting a business. Networking opportunities and incubating for start-ups need to apply the more practical and innovative program to help them equip with skills of problem-solving. In Korea, entrepreneurship education has been active in universities for more than 20 years, but its effectiveness is still insufficient. More innovative methods, such as action learning or project-based learning (PBL), should be introduced. To raise the impact of start-up education, it is necessary to nurture education experts and professionals. This is because the competence of education trainers determines the achievement of trainees. The conference and seminars with education professionals should be activated to share successful experiences.

There is a need to strengthen the competence for born global start-ups. Born global is a kind of company which is involved in the global market from the beginning of the business. It also requires global sourcing of investments, people, and technology. Strengthen cooperation with overseas experts and exploring the possibility of co-founding is easily found in practice. Toward this end, accelerators also need to be globalized to shorten the time from idea to launching the business in the overseas market. It should also provide opportunities to use the global network, including local experienced professionals and networks already established.

For technology-based start-ups to increase their competitiveness in the global market, active support in acquiring and utilizing IP (intellectual property) is important. To make utilizing of IP in technology-based start-ups more effective, it is necessary to support the establishment of IP portfolio strategy in the initial start-up R&D phase. This is because a global strategy without IP acquisition is unlikely to succeed. The patent voucher system should be expanded to make it easier to use a patent attorney or a patent corporation from the very beginning of new venture creation. The IP financing system, such as patent collateral loans and IP-based venture capital investments, should be activated to enhance investment access by technology-based start-ups. It is necessary to establish a strategy to counter the possibility of infringement through utilizing the right of the patent and to use a pre-emptive strategy that blocks the intent to enter the market or pursue the competition by copying or imitating the patent.

To promote the involvement of competent engineers and professionals in technology-based start-ups, compensation by stock options should be extended. To this end, the government should expand the scope of the stock option as enough incentive to attract key personnel. Up to now, capital gain from buying stocks at low prices had been taxed on earned income at the time of exercise, but it is necessary to change the rule of taxation for paying income tax and capital gains tax when stocks were disposed of when qualifying requirements were met.

V. Case of TIPS Policy

1. Overview

TIPS is a government policy program that promotes technology-based start-up establishment with highly qualified human capital by forming start-up teams using private resources such as successful entrepreneurs and venture capitalists and links them with private investment funds and governmental R&D. The

procedure of TIPS is that once TIPS operating companies invest 0.1 million to 0.2 million USD to highly qualified start-up teams and recommend it to the government while incubating, the government provides R&D, commercialization, and global marketing fund. This program was designed to provide an opportunity for technology-based start-ups to secure the money enough to cross the Death Valley and to utilize the screening and incubating capabilities of private investors who have a successful experience as entrepreneurs.

To activate the technology-based start-ups, the Small and Medium Business Administration (SMBA) of the Korean government studied the reference of foreign countries and came up with the policy program in 2013. Among the variety of international cases, the case of Israel was mainly studied. Since 1991, Israel has established about 100 technology-based start-ups every year through TI (Technology Incubator) program. By 2018, they have run 20 incubators with a 50% success rate. With the evidence of the successful outcome of Israel, the Korean government under President Park Geun-Hye launched a private investment-driven technology-based start-up program, which is the TIPS policy. The government set up 'TIPS Town' in July 2015 at Gangnam-gu, Seoul, for funded start-up teams to locate at the specific place for interaction and networking. Under the new government of President Moon Jae-In, TIPS continue to expand as the most successful program for innovative start-ups. In June 2018, post TIPS policy was introduced to strengthen follow-up support. This program was designed to scale up the successful start-ups who graduated from TIPS so that they become global companies by funding the maximum amount of 0.5 million USD within two years.

2. Procedure of Execution

The procedure of execution is composed of the following four steps: 1) selection of incubator operating companies, 2) selection of start-up teams, 3) education and mentoring, 4) graduation and follow up support. Initially, TIPS select the operating companies and authorized them to recommend start-up teams. Through an open competitive bidding system, 5 to 10 companies are selected each year. The qualified candidates for operating companies include angel investment companies founded by entrepreneurs with a successful track record; venture capitalists specialized in early-stage funding, a consortium of research universities, a technology holding company, and domestic and overseas accelerators.

As for the start-up team screening, TIPS operating companies select 1.2 to 1.5 times the number of start-up companies first, and then the government makes the final selection among the companies recommended. Then the start-up teams

which are mentored, educated, and funded about 0.1 million to 0.2 million USD by the operating companies are recommended to the government for the R&D funding and other government supports. The government funds a maximum amount of 0.5 million USD for R&D, and 0.1 million USD for start-up commercialization, and the same amount for global marketing. Besides, angel investor matching fund provide maximum 0.2 million USD and Post TIPS provide maximum 0.5 million USD.

3. Outcomes

As for the TIPS program budget, a total of 450 million USD was allocated from 2013 to 2019 (308 million USD for R&D, 54 million USD for start-up commercialization, 29 million USD for global marketing, 21 million USD for Post TIPS, etc.). By September 2019, 56 operating companies including successful entrepreneur-driven angel investment companies and leading venture companies specialized in early-stage funding were selected. Among these companies, there are 21 angel investment companies, 17 venture capitalists, 17 leading venture companies, 4 new technology financing companies, etc. 828 start-up teams were funded with 148 million USD by angel investment, 274 million USD for R&D, 39 million USD for commercialization, 28 million USD for global marketing.

The major outcome is the involvement of highly qualified professionals in creating start-ups. Out of 2,444 members of founding teams, 1,421 (58%) has master and doctoral degrees, 723 (30%) are from large domestic companies, and 251 (10%) professionals, more specifically, 270 from Samsung, 18 from Apple and Google, 76 from Naver and Daum, 65 from SK, 22 from Intel and Microsoft. The number of employees created by TIPS amounted to 3,687 employees, which is about 5.5 people per company. As a result, 665 companies employed 8,074 people by the end of 2018. The domestic and overseas investment amounted to 1.52 billion USD, a sum of 150 million USD by angel investment and a follow-up investment of 1.37 billion USD. Compared to government investment, 4.3 times higher amount of private investment was induced. Among them, 49 start-up teams realized additional funding of 108 million USD from global venture capital. Two of the teams succeeded in IPO and 12 of them realized M&A.

4. Key Success Factors

The reasons for the positive outcomes of TIPS are as follows. First, start-up teams are selected by private investors such as successful angel investors, accelerators, and venture capitalists. The selection of start-up teams by the government agency has a risk of adverse selection and moral hazard because of

limited screening and monitoring capacity. Private investors are likely to result in a higher success rate by making investment decisions to minimize their loss and maximize profit.

Second, the TIPS mentoring and education program from successful entrepreneurs and venture capitalists with professional knowledge proved to be very effective. It is because start-up teams not only need capitals but also experience-based knowledge and information. The TIPS program provides direct mentoring and coaching by investors and enables start-up teams to grasp practical knowledge rather than theoretical knowledge. This process reduces the cost of trial and error of start-up companies and prevents the CEO from wasting time and money while increasing the probability of success of start-ups.

Third, through providing R&D, commercialization, and marketing fund in a full package along with the matching investments, the program could achieve remarkable success. Before TIPS, there has not been a packaged support program. Therefore, supported companies were not able to make an effective outcome. However, TIPS could provide fully integrated support for technology-based start-ups to overcome the Death Valley which refers to the stage that the company runs out of capitals and suffer from poor sales revenue while technology and product development in progress.

Fourth, after initial support from the government, TIPS induced private investors that committed the fund more than four times government support including several foreign investors. Receiving foreign investment means that TIPS has selected the start-up teams that have a high potential of entering the global market. The performance of TIPS suggests that Korea's start-ups have been activated through initiatives by private investors.

Fifth, an effective government monitoring process contributed to the successful outcome. The government's involvement or control over TIPS has been minimized while supervising indirectly. Solving problems and correcting mistakes were crucial in the process of execution of the program. In this sense, TIPS is considered a good example that could minimize the dysfunction of government sponsorship through prudent and cautious intervention in the process.

VI. Conclusions

Six conditions to enable innovative technology-based start-ups were examined. These include expanding markets, increasing investment, supporting technology commercialization, establishing a fair-trade system, reducing failure cost, and enhancing entrepreneurial capabilities. Promotion of technology-based start-ups is the most important national strategic goal to address the dilemma

faced by the Korean economy today. At present, the Korean economy is in a situation of high uncertainty in making progress for future development due to the slowdown of economic growth, low birth rate, rapid aging, and maturing of major industries, etc.

Korea government tries hard to overcome economic and social adversity at present by making the innovation-driven economy and building a fair competition ecosystem. Despite all its efforts, the most indicators of the economic situation show the pessimistic prospect for the time being. To establish a system of fair trade, institutional reform is in progress, forcing the conglomerates to open their inside trading market for outside SMEs and start-ups. At the same time, it is also necessary to accelerate the collaboration between large corporations and start-ups in entering the overseas market.

While overcoming the many obstacles that hinder the social and economic progress through implementing the policy of reformation and innovation, Korea needs to make the coming era of the 4th industrial revolution a new opportunity for sustainable growth. The high priority of the policy should be concentrated on promoting high-quality technology-based start-ups. Even if an entrepreneur experiences business failure, he or she should have an opportunity to re-challenge. Toward this end, the effective ecosystem for re-challenge needs to be established while reducing the cost of failure as much as possible. To enhance the effectiveness of policy-making and implementing that supports the growth of SMEs, the government should change its roles and responsibilities from driver to facilitator, giving more initiatives to private sectors. In the long run, private sector-led need to be created to enable the market to stimulate entrepreneurship of all sectors of the society.

TIPS has been regarded as a successful policy so far as a private-led technology-based start-up policy. While minimizing the adverse effects of the government-led start-up policy, the TIPS companies are strengthening their sustainability and expanding into the global market by getting more funding from private and foreign investors. In particular, it has made a positive contribution to the participation of outstanding professionals in the start-up market. There should be many success stories in the global market through scale-up. Since TIPS- supported companies have been concentrated in the metropolitan area, it is necessary to strengthen the infrastructure and support system in the local community so that technology-based start-ups can be actively developed in other places in the future.

References

- Chen, C.J. (2009) Technology commercialization, incubator and venture capital and new venture performance, *Journal of Business research*, 62(1), 93-103.
- Deeds, D.L., DeCarolis, D. and Coombs, J. (2000) Dynamic capabilities and new product development in high technology ventures: an empirical analysis of new biotechnology firms, *Journal of Business venturing*, 15(3), 211-229.
- Dyer, J.H., Gregersen, H.B. and Christensen, C. (2008) Entrepreneur behaviors, opportunity recognition, and the origins of innovative ventures, *Strategic Entrepreneurship Journal*, 2(4), 317-338.
- Gimmon, E. and Levie, J. (2010) Founder's human capital, external investment, and the survival of new high-technology ventures, *Research Policy*, 39(9), 1214-1226.
- Hyytinen, A., Pajarinen, M. and Rouvinen, P. (2015) Does innovativeness reduce startup survival rates?, *Journal of Business Venturing*, 30(4), 564-581.
- Kim, H.K. and Kim, C.K. (2018) The effects of network between business founder and investor on enterprise performance: focused on TIPS support business, *Asia-Pacific Journal of Business Venturing and Entrepreneurship*, 13(3), 47-57.
- Li, H. and Atuahene-Gima, K. (2001) Product innovation strategy and the performance of new technology ventures in China, *Academy of Management Journal*, 44(6), 1123-1134.
- Lee, C.Y., Hwang, I.H. and Kim, J.S. (2016) The influential factors to growth intention and performance in early-stage technology-based start-up companies, *Asia-Pacific Journal of Business Venturing and Entrepreneurship*, 11(2), 49-62.
- Porter M. (1990) *The Competitive Advantage of Nation*, Palgrave MacMillan
- Souitaris, V. and Maestro, B.M. (2010) Polychronicity in top management teams: the impact on strategic decision processes and performance of new technology ventures, *Strategic Management Journal*, 31(6), 652-678.