

STI in History\* :

# The Creation of Government-supported Research Institutes during the Park Chung-hee Era

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## 1. INTRODUCTION

*Daedeok Science Town* is composed of numerous research institutes and is known as the *Mecca of Science and Technology* in South Korea. The institutes, especially government-supported research institutes (GRIs), have played a leading role in the national growth and development of science and technology. Among the leading institutes at *Daedeok* are the Electronics and Telecommunications Research Institute (ETRI) that first developed commercialized CDMA technology and established South Korea as a leader in mobile communication devices and the Korea Atomic Energy Research Institute (KAERI) that invented the multipurpose research nuclear reactor 'HANARO'. After the Korea Institute of Science and Technology (KIST), the first GRI, was founded in 1966, several GRIs were successfully established at *Hongreung*, where the first modern research complex appeared. In the 1970s, GRIs increased as *Daedeok Science Town* was realized. Since then, GRIs have been recognized as a symbol of national science development in the 1970s as well as the Science and Technology Policy of the Park Chung-hee administration. However, those institutes had to suffer difficulties in operation as a new government took over the office after the Park Regime.

This paper surveys the historical and political background for the Park Chung-hee era in the emergence and expansion of GRIs in the 1960s and 1970s. There existed different formats of scientific research institutes before KIST. Public and national institutes, universities, and university-affiliated institutes were in operation, and some industrial actors had their own research organizations. This study investigates how and why GRIs (then a new format of institution) emerged given the historical and material environments. This study focuses on how KIST, an institution that started from a single research institute, could gain so much attention and influence to successfully formulate the entire research pattern of Korea. Searching for the answer to such questions, I found that GRIs formed the very center of the science and technology of South Korea since 1970s and the researchers from KIST obtained undue power and influence on society. Such fast social and political transition needs to be

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understood in the context of the expansion process of GRIs and their assigned roles as well as political relationships. Also discussed are what limitations GRIs had and why they had to suffer difficulties during the early post Park Chung-hee era. The historical survey of this paper reveals that even science and technology policies - often viewed as apolitical - have political meaning and that no policy is completely free of political calculation.

## 2. THE ESTABLISHMENT OF KIST : THE BIRTH OF THE FIRST GRI IN SOUTH KOREA

After liberation from Japanese colonial rule, many scientists argued that government organizations and research institutes for development of science should be established for nation-building because the promotion of science and technology is crucial for national development; however, their claims failed to receive any attention. In spite of the enthusiasm by scientists, the government and politicians had no interests in science and technology until the late 1950s. In 1959, both the Office of Atomic Energy, a government unit for the nuclear program, and the Atomic Energy Research Institute (AERI), a national research institute for nuclear technology, were established. Even though the role of AERI was limited to studies of nuclear energy, it was the first modern institute supported by the government for development of science and technology. Although AERI could receive unprecedented attention and conditions, it still had limitations as a national and public institute. The financial and material support for the institute was insufficient. The researchers at the institute were all government-employed public officials bounded to the laws and regulations of public officials. They were not treated properly in terms of salary and employment benefits. It was also difficult to provide the institute with research incentives, additional research capacity, and proper infrastructure. Even the financial conditions were not friendly. The flexible and creative use of government funds was not allowed by the strict accounting procedures since every government budget allocation was regulated. More than an effort to overcome the obstacle and to build a new type of research institute had been made since the early 1960s. The government attempted to convert existing national institutes into non-governmental institutes to ensure a more flexible use of funds and human resources; however, it was a failure due to objections from members of existing institutes who wanted to maintain their public official status. The attempt of reform was also impeded by the lack of financial resources that were necessary for building new research institutes. The breakthrough was created during the *May 1965 Bilateral Summit* between South Korea and the United States where President Lyndon B. Johnson expressed his interests in supporting the establishment of a new research institute for Korea. The offer was formed by the Chief Science and Technology Advisor to the President Dr. Donald F. Hornig who was instructed by President Johnson for the visit of President Park to Washington. From one angle, US support was thought of as compensation for the Korean government decision to deploy combat troops to Vietnam. It could create mutual benefits. The US side could make a counter case of brain-drain. At the same time, this suggestion was designed to placate Koreans' opposition to the normalization of Korean-Japanese diplomatic relations, which was in the final stages of negotiations, as well as to indicate that US assistance would continue after the restoration of diplomatic relations between the two countries. The United States offered a 150 million-dollar loan for economic development as well as financial aid for building research institutes; so that they could assure Seoul that the US was supportive of the administration of Park Chung-hee and Korean economies and society. The mutually supporting gestures between Seoul and Washington enabled both countries to win what they wanted through participation in the Vietnam War and the normalization of Korea-

Japan relations. In fact, closely interwoven were all of the three issues: Korea's deployment of troops to Vietnam, the normalization of Korea-Japan relations, and the economic development of the post-war Korea. Since the US had practical interests in those matters, it had to actively intervene. The decision of supporting scientific research institutes was an attractive option for the White House because financial aid for research was apolitical and they could still support the Park regime substantially. The institute support was more than a mere assistance for economic growth; it was a significant contribution in creating a positive image for the authoritarian regime. President Park was aware of the possible benefits and accepted the offer without hesitation.

In February of 1966, the Korea Institute of Science and Technology (KIST) was established at *Hongreung*, which used to be a forestry experiment station. Dr. Hyung-sup Choi, then director of Atomic Energy Research Institute, was appointed as the first director. Although it was established under the auspices of Korean and the US governments, KIST was legally registered as a foundation whose endowment and transfer of funds was guaranteed securely by the government according to the *Promotion Act for the Korea Institute of Science and Technology*. The form of the foundation was agreed on by both governments. The Korean government wanted to avoid inefficiencies that any national or public institutes suffered, and the US agreed to KIST's legal status as a foundation because they wanted to prevent excessive interference by the Korean government. President Park donated one million won and listed himself as a founder of KIST. This shows how KIST (a private institute with autonomy and independence) could receive governmental support due the patronage of President Park who played key roles in mediating disputes that involve the institute during its installation. Park's personal engagement had effects on individual researchers in KIST: their socio-economic status was raised, and they felt pressure as well as pride. The President's support was an important factor that enabled KIST to grow in short period of time with stable aid from the government. The active and unprecedented support of the government for KIST (including salaries three times higher than those for faculty members of national universities) served as momentum and stimuli for scientists to produce extraordinary outcomes and performance. By adopting a contract-based research system and attracting Korean scientists from abroad, KIST decided to concentrate its resources on studies of industrial technologies that would contribute the national economic growth. KIST received financial support from the government, even though it was a legally independent foundation. The contract-based research system that served mainly industrial needs for technology was also different from other research organizations. KIST followed the model of Battelle Memorial Institute (BMI) in the US. However, BMI was the contract-based institute, which was established with the private fund. In most advanced countries, research facilities and organization are national or public institutes, especially those deeply involved in government-run projects. The status of the juridical foundation was unusual because most non-profit corporations that receive government aid are registered as consortia or associations of multiple institutes. KIST was unusual as a single individual institute constituted as an independent foundation that received governmental supports. Research institutes for industrial technology were most likely to be run by private funds rather than governmental ones. KIST was exceptional in terms of legal status and its operating policies. Thanks to enormous support from the government, KIST was able to grow faster than expected, and finally established itself in Korean society. It was of significant importance that KIST accepted talent from abroad. The return of excellent scientists from other countries could be understood as an indicator showing improved national prestige. KIST was a bipartisan, apolitical, top-tier and independent research institute that was politically meaningful for the Park administration, which had a presidential election scheduled for 1967. In order to reinforce such a propagandistic function, Park wanted to make KIST the largest research institute in Asia. In turn, the initial plan of KIST had to be changed; however, the US disagree with the

modified plan and the Korean government was solely responsible for all the additional costs for the expansion. As expected by the government, KIST successfully attracted Korean scientists and engineers from abroad. Their return received so much attention that the employment contracts between KIST and scientists abroad were headlined by major papers. Except for a scientist who was selected as the Korean representative for an international cooperative projects, 24 of 25 overseas scientists who came back to Korea to contract with KIST in the early years of KIST renewed their contracts with KIST. Such a successful repatriation had a positive influence on those who were thinking about returning to Korea. The social interest in returning scientists remained undiminished in the 1970s. Profiles of new returning scientists continue to be reported in newspapers. KIST functioned very well as the symbol of the modernization of the country that greatly substantiated the legitimacy of the regime. Numerous promotional activities including making films and brochures were also conducted to inform the public of KIST and KIST became a noted location to be visited by honored foreign guests. Those were not irrelevant to the fulfillment of politically calculated interests.

### 3. THE CREATION OF *HONGREUNG* RESEARCH COMPLEX : THE CONSOLIDATION OF GRIs

The establishment of KIST in 1966 created a national interest in science and technology. It was also followed by the foundation of other institutes and organization for the development of science and technology. The construction of research institutes boomed and some journalists and scientists started raising issues over the administration for science and technology, human resource management, and research environment. In order to address such issues, the first *National Convention of Scientists and Engineers* was held on May 19, 1966, right after the completion of KIST. Founded on a resolution adopted by the Convention, the Korean Federation of Science and Technology Societies (KOFST) was created in September 1966. In the following year, the *Science and Technology Promotion Act*, (the first comprehensive law on the development of science and technology) was enacted. The Ministry of Science and Technology was also established to take responsibility for policies on science and technology development. The Korean Association of Science and Technology was launched at the end of 1967 to meet the welfare of retired scientists and to promote the popularization of science. President Park listed himself as a founder of the Association. As we have seen above, the creation of KIST inspired the country to form necessary administrative organizations and systematic support. One Korean newspaper termed these series of events as “the science and technology boom,” which was not an overstatement. It tells us that the modern and systematic approach to national science and technology development was first introduced and formed in that period of time.

The second GRIs were established while the 'boom' was still in effect, the Korean Scientific and Technological Information Center (KORSTIC) who had been under the supervision of the Ministry of Culture and Education at first and then was under the Ministry of Science and Technology in the form of foundation. Since it was reorganized as a foundation in 1968, KORSTIC began to build its building around KIST. The role and size of KORSTIC became more comprehensive as the *Act for the Promotion of Science and Technology Information Center* was enacted in 1969. It was known that President Park directed the Presidential Office to take charge of the center and ensure the necessary support as had been done for KIST. Support by the government was remarkably increased as Chief of Presidential Secretary Mr. Hoo-rak Lee was designated as the chairman of the board of KORSTIC and Secretary Mr. Dong-sik Shin became a member of the board. Starting in 1970, the government invested in defense development and established a research institute for defense technology and de-

velopment. By 1970, South Korea had witnessed a series of security-threatening incidents, including the failed assassination attempt of Park Chung-hee in 1968 (The *Cheongwadae* Raid), the kidnap of Korean Naval ship in 1970, and the articulation of the Nixon doctrine. The necessity of increased investments in the defense industry and defense development dramatically increased with the unstable security situation. The Ministry of Defense established the Agency for Defense Development (ADD) under its own jurisdiction in August 1970; however, the government reorganized the agency into an independent corporation at the end of that year. In addition, the *Agency for Defense Development Act* was enacted for such reform and the ADD moved next to KIST. General Eung-kyun Shin was appointed as the first director of ADD. He served as the head of the department of administration of KIST. General Shin was replaced by Dr. Moon-taek Shim, who was appointed as the director of KIST in 1972. Director Shim transferred some of the researchers at KIST to ADD to have them take charge of administration as well as research. He held the office until 1980 and devoted himself to creating the foundation for the domestic production of weapons. In the 1970s, ADD recruited a number of talented researchers from domestic and foreign institutes that earned it the reputation as the 'final destination' for scientists in the 1970s. Along with KIST, it took a leading role in the development of science and technology in 1970s. The process to establish KIST - the non-profit research organizations were founded with the government fund and by support of government and enacted relevant statutes for promoting such organizations - became the model for the establishment of GRIs. The same method was applied to other fields, such as the social sciences and the humanities. In 1971, the first GRI in the field of social science, the Korea Development Institute (KDI) was established to address economic development issues and problems. As the *Korea Development Institute Act* was enacted in the end of 1970, the establishment of the KDI, which was also located in *Hongreung*, began full-speed. As he did for KIST, President Park was deeply involved in creating of KDI and attracting Korean scholars (particularly those who were well acquainted with a market economy) from abroad to KDI. As he did for KIST, the President again donated one million won to KDI. Other research institutes for the social sciences and humanities, like the Korean Educational Development Institute, took similar paths. Another institute that joined *Hongreung* was the Korea Advanced Institute of Science (KAIS). KAIS is a graduate school established in 1971 that specializes in natural science and engineering. The President ordered the Ministry of Science and Technology to take charge of KAIS because the Ministry of Education and Culture strongly opposed the proposed plan of 1969 for new graduate schools of natural science and engineering. The *Korea Advanced Institute of Science Act* was immediately promulgated in August of 1970. There also had been some objections and complaints from universities over the privileged status and treatment of KIST faculties. Similar voices were heard regarding the creation of KAIS. The widespread critique of 'unfair treatment' made scholars and scientists in universities turn against the *Cheongwadae* (The Presidential Office of Korea). Park Chung-hee, who used to pay attention to the voices of scholars and experts during his first term of presidency, began to underestimate the role of scholars and scientists in the 1970's. In deciding on the recipients of governmental support for science and technology, he explicitly preferred new institutes such as KIST and KAIS over universities that would oppose new trends of study or economic development. As key GRIs in various fields gathered around KIST, *Hongreung* (in the center of which KIST was located) became the first research complex in South Korea. The complex was not built intentionally; instead it naturally emerged as new research institutes and organizations found the location of KIST suitable. Therefore, there was no official title for that research complex and the public often referred it as 'Seoul Research Complex' or '*Hongreung* Research Town'. Whatever it was called, research institutes in *Hongreung* played the role of think tanks in Korea in different areas like science, technology, economy, and defense. Institutes of *Hongreung* varied as they were characterized as

different organizations, ranging from research institutes, to research support centers, to educational institutes. However, they followed the same system of KIST as a GRI. Being a government-owned institute located in *Gongreung*, the Korea Atomic Energy Research Institute (KAERI) was also a participant in the '*Hongreung* Research complex' as the *Korea Atomic Energy Research Institute Act* was enacted in 1973 and the act transformed KAERI into a government-supported institute. Only two months since Dr. Hyung-sup Choi was appointed as the second Minister of Science and Development, Dr. Yong-ku Yoon, who was the research director at KIST was transferred to the office of the director of KAERI. Dr. Yoon initiated the reforming of the institute due to the willingness of Minister Choi. Although they were represented as private organizations in terms of their establishment, it would be more appropriate to call them 'quasi-government organizations' since their work and research was deeply related to the government. Although research institutes adopted the contract-based research system, they often had to meet the government demands without contracts. That is why the relationship between the institute and the government was often described as 'mobilization', rather than 'contract'. A historical coincidence is that the US had a shared interest with the Korean government in building KIST. This had an enormous influence on the future of Korea's science and technology research. The institutionalization of GRIs became the common rule for the establishment of any research organization in either social science or natural science. Such a consequence was largely due to the 'success' that KIST enjoyed in its early years.

#### 4. THE CONSTRUCTION OF DAEDEOK SCIENCE TOWN : THE PROLIFERATION OF GRIs

Although *Hongreung* research complex received attention for being the first research complex in the country, there were limitations for it was not 'planned' to be such a complex. It was not able to physically expand due to the limited land. It was also criticized for surroundings (mainly due to the expansion of Seoul) that were not appropriate for a research facility. Facing such limitations and challenges, the Ministry of Science and Technology tried to create a genuine and efficient research complex. Such effort was realized as Dr. Choi resumed his duty as the Minister of Science and Technology. He strategically gave a presentation in front of the President while on a New Year's inspection tour of the Ministry in January of 1973. At the end of that year the government approved the basic plan for the research and education city of *Daedeok*. The plan envisioned a self-sufficient city where five new research institutes of strategic industrial technology, research facilities, and universities would be constructed. After one-year-long process of planning, the size and scope of the park increased. The complex was to support six strategic industrial fields as declared in *the National Heavy and Chemical Industry Policy*. It is known that most of GRIs as well as the research complex itself were built to support the Park administration's ambitious plan of heavy and chemical industrialization. Research and development was not supposed to take precedence. Neither the President's annual address of 1973 nor the *Report on the Reshaping of Industrial Structure in Accordance with the National Heavy and Chemical Industrialization Policy* by the senior secretary of economic affairs at the Presidential Office considered the establishment of any research institutes. Promotional laws had already been in effect for individual industries since the late 1960s and were established ahead of the declaration of the national heavy and chemical industrialization plan; however, none of them referred to research institutes or the construction of one. The creation of research institutes and organizations was initiated by the Ministry of Science and Technology or a group of researchers who had stake in the institutes and not led by industrial actors (who were the major consumer of industrial technologies) or

by governmental branches of industry. The *Daedeok* Science Town was initiated with less relevance to the government's lead in heavy and chemical industries. The link between research and industry was possible because respective plans of research complex and industrial policy started around same period. As a result, GRIs could increase in the complex. The most important figure in the construction of *Daedeok* and the expansion of GRIs was Dr. Choi, then Minister of Science and Technology. In 1971, KIST's first director, Dr. Choi was appointed the Minister of Science and Technology in recognition of his distinguished service at KIST. He served for 7 years and 7 months, which was the longest term for any minister in Korean history. He formulated the first-ever systematic policies for the national science and technology in the 1970s that included the construction of *Daedeok*. He had experience as a director at both national and GRI. The balanced experience helped him have a firm stance on the strengths of GRIs. Therefore, he was the most active in supporting and extending the mandate for GRIs. During his time in office, he promoted the establishment of a research complex and the switchover of AERI into a non-profit private organization, KAERI. Accepting the cabinet position, he recommended Dr. Chang-suk Lee, who was at KIST, for the Vice Minister of Science and Technology. For the following 7 years and 9 months, Lee supported the Minister of Science and Technology. The original plan was to reorganize and extend the five existing research labs at KIST. These five institutes were to follow the process of the establishment of KIST. Consequently, KIST set the standard of research institutes. Only three research institutes directly branched off from KIST; however, it has been asserted that KIST was the matrix of all GRIs. The construction plan of *Daedeok* had gone through several changes. The amendment of 1976 was the one that curtailed the original plan, from building 'the city of research and education' down into 'a research complex' since the downtown construction had been deferred. It became possible to build GRIs in other industrial complexes, such as *Changwon* and *Koomi*. Accordingly, the total number of GRIs increased and governmental agencies tried to found GRIs competitively. For example, four new institutes joined *Daedeok*; two in *Changwon* Machine Industrial Complex, one in *Koomi* Electronic Industrial Complex, and KIST's affiliate, Telecommunication Technology Institute in Seoul in 1976. The system of GRIs started in *Hongreung* was forming its base in *Daedeok*, and branched throughout the country down to places like *Changwon* and *Koomi*. There was a boom of GRIs in science and technology in the 1970s. The boom continued until the late 1980 by when South Korea had 19 GRIs in operation, including one affiliated institute. The fact that most GRIs had Park Chung-hee's name on the list of founders contributed in creating the image of a leadership actively involved in science and technology. Industrial circles had contributed to the establishment of Korea Research Institute of Chemistry Technology (KRICT); however, the name of the President took their places and 17 of contributors were dropped from the list of founders after several changes. The increase in GRIs led by the construction of *Daedeok* research complex formed the core of the government science and technology policy in the 1970s. Backed by the government, GRIs could enjoy a dominant influence. GRIs had been granted large amounts of research funds although they were numerically inferior to national institutions and universities. The sum of the research funds GRIs received from the government or private investments was greater than other institutions. Such an imbalance of funding implies that the center of power in science and technology moved to GRIs. Given the unfriendly circumstances for science and technology (immature governmental policies, low social awareness, little attention and interests in science technology), GRIs were the entities that played influential roles for the first time in the modern history of Korea. In addition, the ideas nurtured by Hyung-sup Choi were backed by President Park. Meanwhile, researchers at KIST were nominated for top management positions at newly created institutes. Centered on Choi, the 'KIST circle' acted as the power elite in science and technology. Choi himself led a social network, called 'Pi Club', to instill innovative ideas and trends into

the science and technology in South Korea. His dream was realized by taking several key positions that included the Director of KIST and the Minister of Science and Technology that formed his own 'club' of influence. However, he could not avoid negative critiques within the science and technology community. Even the press often criticized Choi by labeling him as the Minister of 'KIST' instead of 'MOST' (Minister of Science and Technology) and showed sarcasm towards his private network or club of elites. Such dominance of KIST was responsible for the later criticism and negative perception of KIST by the public.

## 5. THE PERFORMANCE OF GRIS AND THEIR LIMITATIONS

The continued creation of GRIs brought many changes in science and technology. First, a research and development system was established in science and technology for the first time. During the Park administration, the universities could not function properly in providing high education in science and technology due to poor facilities and research environments. It was difficult to realistically carry out research and development activities except on a few research subjects. In the industries that should have supported research and development, did not have interest and competence in developing research and development. GRIs built facilities for testing and attracted high caliber personnel under the auspices of the government, KIST, and the Agency for Defense Development (ADD) continued to produce research performance. Those personnel who accumulated research experiences in such research institutes moved to other research institutes, universities and companies so that new technology and their experiences in developing science and technology was disseminated to various areas. GRIs in 1970s are evaluated as praiseworthy for developing or cultivating excellent human capital resources for research activities; however, not for the performances of R&D themselves. In addition, to overcome brain drain most GRIs induced experienced R&D personnel from other countries to immigrate to Korea. By the mid-1960s, Korea was a country where the problem of brain drain was serious; however, Korea was unaware of how serious it was and was unable to find a solution. However, talented Korean scientists from other countries returned to Korea in greater numbers after KIST was established. The Korean government was confident with this and changed its passive policy that had heavily regulated Korean scientists that wanted to study abroad to an active policy that induced Korean scientists from other countries to return to Korea using government resources. In addition, in the early stage of 1970s, newly open GRIs became more active at inducing Korean scientists working overseas and the number of returning talented scientists steadily increased. As a result, the return rate of scientists that had studied abroad was 10% in 1960s; however, the rate steadily increased to 68.4% in 1980s. The research that the brain drain was no longer a problem in Korea came out in 1990s. Although research performances accomplished by the GRIs in the 1970s were not so attractive, their research activities changed to social awareness and evaluation from research and development. Since KIST could not promote enough research works commissioned by industry in the early stage of the KIST establishment, KIST should continuously persuade industries to consign research works to KIST by exercising promotion activities by showing the value of research, development work, and capabilities. As the president encouraged industries to make research contracts with KIST, some companies gave money *Cheongwadae* to promote the research work of KIST without designating specific research objectives by saying, "We totally agree with the policy of the president who supports development of science and technology which supports the economic development." This episodes show that Korean public considered the money for research works to be utilized



in manufacturing sites as the money for political capital. However, companies that faced difficulties in introducing technology from other countries to Korea or in acquiring raw materials or had troubles in equipment introduced from abroad were successfully overcoming such difficulties. They solved troubles by utilizing the research outcomes and development. Companies were becoming more aware of the necessity for research and development that motivated companies to contract with KIST for research work. In addition, as companies had accumulated the experiences that had commercialized the research outcomes of GRIs, the policy to protect the technology developed over the past couple of years in Korea was established for the first time. As a result, with more interest and understanding from government agencies and industries for research and development, the GRIs increased the demand for research and development. Under the circumstance that the research and development was not main issue, the research institutes were established and social awareness over research and development could be improved. At the 10th anniversary of KIST in October 1976, President Park Chung-hee, sent a writing, “科學立國 技術自立” (‘nation-building through science, self-reliance in technology’) to KIST. This demonstrates that KIST was considered as a symbol of national modernization and that the role mandated to GRIs was ‘independence of technology’. The promotion of science and technology that scientists and engineers had sought for the liberation of Korea was actually activated in the late 1960s and its actual meaning was specified with the independence of technology. The scientists and engineers pursued science and technology promotion in the long term, not just to seek for independence of technology, but the Korean government adopted this as the independence of technology. The Korean government finally responded by claims of scientists and engineers for the development of science and technology after 20 years because the government believed they would develop technology for the economic development and lead a defense industry that could contribute to national security. The Korean government devoted its interest and support to the GRIs because the administration of Park Chung-hee had used economic development, national security, and science and technology as a cornerstone for its legitimacy. Several GRIs such as KIST or KAERI as well as ADD conducted defense industry related research activities. It was obvious that the research institutes existed for research and development as well as for a new way to strengthen the political power of the Park Chung-hee administration. The formation of *Daedeok* Science Town and the creation of research institutes signified the simultaneous foundation of science and technology development and political value. However, the creation of many research institutions before and after 1976 created plenty of problems. Above all, those institutes could not acquire sufficient funding to operate. Since the government already spent vast amounts of money in establishing those institutes, it could not afford the operational funding. In addition, due to the 2<sup>nd</sup> oil shock from the late 1978 and subsequent economic recession, companies who had showed some interest to research and development avoided investing. As a result, new research institutes as well as existing research institutes such as KIST had suffered from significant funding shortage. The subsequent creation of many GRIs concentrated too much on the development of industrial technology. However, it was natural that the GRIs focused on the areas of industrial technology with the purpose of independence of technology and economic growth through research and development activities because the government funded those institutes. The government under these economic circumstances could not have a balanced policy for science and technology that included basic science as well. Notwithstanding, the administration of Park Chung-hee established many research institutes in pursuit of industrial technology development to justify its legitimacy; however, the basic academic areas could not be neglected solely because of the government science and technology policy. For this reason, university researchers complained about the government policy saying, “We do not have any policy for science. We only have a policy for technology.” The policy for the establishment of GRIs led ‘Science and Technology’

as a technological and practical perspective of science to be presented as one of the important characteristics of a science culture in Korea. The research institutes were established in a short time without sufficient discussion and preparation. These institutes were mismanaged; instead, they followed the management model of KIST rather than appropriate operating methods for specific research areas or missions assigned to each institute. Small or big problems occurred because the KIST system was accepted without a proper understanding or consideration for the reason and background of the KIST establishment. The in-depth analysis and evaluation of the merits and demerits for KIST should have been conducted before new research institutes used KIST as their model. However, it was difficult to expect such procedure to be taken because the President Park Chung Hee was the founder of the institute and the first director of KIST became the Minister of Science and Technology. KIST was not just a research institute for science and technology but an institute with strong political power as a symbol of 'The president's strong interest in science and technology' and Changed Nation. The competitive creation of many research institutes by each Ministry for a short period occurred because of fundamental problems and that the overall compressive adjustments could not be accomplished after the establishment of such institutes because the main Ministries in charge of such research institutes could not be clearly defined. For this reason, conflict occurred among institutes in the early stages of establishment of the institutes and raised the problem of overlapping of functions. The merger among institutes was mentioned before completing the construction of research institutes. It was too much to expect that GRIs cooperate with other research and development entities such as universities or industry institutes since even the government ministries could not conduct the needed overall adjustments. There was increasing competition among institutes in attracting talented researchers. The standard of living was not satisfactory for experienced researchers from other countries because the institutes were established in rural districts where convenient facilities were not available. Each institute had several managers and they had to do administrative works of the institutes instead of research. There insufficient professional personnel for research and development and many of its capabilities could not be appropriately used; in addition, there were some internal conflicts among researchers. The formation of *Daedeok* Science Town and the creation of research institutes were not made under a long-term or comprehensive government plan. For example, the Korea Research Institute of Shipbuilding and the Korea Ocean Research and Development Institute were established as affiliated institutes of KIST in 1973 and were integrated to form a Korea Shipbuilding and Ocean Research Institute in 1976. However, the Korea Ocean Research and Development Institute was separated as an affiliated institute of KIST in 1978. Research institutes for shipbuilding and maritime areas experienced several processes of independent establishment, mergers, and separation in less than five years. This shows that the establishment of research institutes by the government was not stable under a sufficient review of a long-term master plan. The Ministry of Science and Technology declared that it would supervise and manage those institutes by integrating them because the research institutes had difficulty in acquiring research personnel and overlapping roles; however, it was not easy for the Ministry of Science and Technology to supervise different institutes who had different governing bodies. Under these circumstances, the administration of Park Chung-hee, (who was registered as the founder of the organization) was withdrawn and a new administration was presented. The result was the development of negative opinions and press coverage on GRIs. Subsequently, the number of GRIs was reduced to 8 from 16 by mergers and restructuring.

## 6. CONCLUSION

After the liberation of Korea, scientists and engineers urged the government to promote science and technology development to the establishment of an independent administrative body for science and technology policy as well as for research institutes so that science and technology would play an important role in leading a new nation. However, the government only established KIST in the late of 1960s. Science and technology had been treated as one of subjects for education until mid-1960s and yet, science and technology started to be linked with economic development after KIST. Soon after, the science and technology was emerged as the issue to support national security and to support the economy and national defense. Subsequently, the government established consecutive GRIs and registered Park Chung-hee as a founder of those institutes to show off its interest and understanding in science and technology. The administration of Park Chung-hee used 'Economic development' and 'National security' to justify its legitimacy and as a result two slogans closely related to science and technology emerged. GRIs starting from KIST had been expanded through the 1970s through the establishment of specialized institutes for each specific area. The role of the government is significant for the process of science and technology development in the late industrialized countries. However, in Korea, private research and development was led by number of non-for profit research institutes for government-led industrial technology research. The history of Korea in science and technology policy is the history of GRIs in the 1970s. GRIs played a pivotal role in science and technology independence under the circumstances where universities or industry did not show strong interest or did not have enough competence in research and development. GRIs played significant role in the political and economic terms during this period.

In spite of the quantitative growth and grand-looking hardware, GRIs were expanded without a deliberate policy calibration for a comprehensive and long-term plan. Such growth-oriented policies had problems that are categorized as myopic. The most culpable one is that the government hastily applied the KIST model without proper consideration of circumstances. The Park administration did not pay sufficient attention to understanding and evaluating the success of KIST because they were too encouraged by initial 'success'. There were numerous factors that contributed the success of KIST that include the personal interest of Park Chung-hee, the intentionally concentrated support of the government because of the political value of KIST, and the positive roles played by the United States. Such friendly conditions and positive externalities were not available for most of the newly constructed research institutes. KIST was different from other institutes because as a political symbol, the institute already had some political leverage through the President and the Minister of Science and Technology. Such political influence prevented further examination or analysis of KIST. Led by the Minister, Choi, who was the first director of KIST, the KIST model was able to be exported to and adopted by other institutes across different fields of studies. As expected, GRIs had to go through the merger and abolition process after President Park, who himself was also a founder of most GRIs, disappeared. KIST was unable to avoid restructuring and it was forced to change into the Korea Advanced Institute of Science and Technology (KAIST) when combined with KAIS. The legendary success of KIST excessively boosted the expansion of GRIs; however, it eventually led to its own self-mandated abolition. Although the institution of GRIs was designed to ensure the autonomy of research organizations, GRIs were vulnerable to political events because the 'autonomy' of GRIs relied on the governmental support and their political relationship with the central government. The limitations of the GRI model are revealed in the rise and fall of KIST, the first-ever government-supported research institute.