THE KIST IN SOUTH KOREA AND THE ISSUES ON THE ESTABLISHMENT OF THE V-KIST IN VIETNAM

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"The two sides agreed that the development of science and technology plays an important role in the sustainable development of Vietnam. The both sides welcome the signature of an agreement to establish the Vietnam-Korea Institute of Science and Technology (V-KIST) in the form of a project of the Korea International Cooperation Agency (KOICA) and agreed to cooperate to make this project a successful model of development cooperation between the two countries" (Vietnam-South Korea Joint Statement - 9th September 2013).

Abstract:

In order to make science and technology (S&T) to really play a core role in improving labor productivity and competitiveness of the economy, besides of clear identification and deep understanding of the position of S&T as "a top national focused policy", the issues of the rational development of the hierarchy of scientific research institutions and especially the mechanisms for linking S&T to production, which are in line with market economy institutions, are very decisive. While establishing such mechanisms, South Korea successfully built the KIST model and expanded it into its entire S&T research system. Currently, the South Korean government has been helping Vietnam to build the V-KIST Institute following the model of South Korea's KIST. During the implementation of the V-KIST, what are the key issues that Vietnam should pay attention for to achieve the expected success?

Keywords: *S&T; KIST; V-KIST; Vietnam; South Korea.*

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The development of national S&T capacities and the introduction of S&T results into production activities are ones of top concerns of all economies. The sustainable development of the national economy should based on the enhancement of its labor productivity. The labor productivity, in its turn, depends on numerous factors where the most long - lasting and deciding factor is the technological level of production. Therefore, a production

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system based on (or supported by) a strong and modern S&T platform would be able to enhance regularly its productivity and competing capacities on market. A country which has many research facilities and numerous researchers but fails to provide sufficient supports for production activities offers only necessary conditions to improve the labor productivity. The sufficient conditions occur only if these research activities must really become a backbone for the production in terms of technologies; the production units must demand/be forced to rely on technological innovation to improve its labor productivity; and their business becomes more and more profitable mainly due to the improvement of the competitiveness by applying technologies.

In the 2016-2020 period, Vietnam carries out the tasks as stated in the Document of the Communist Party's 12th Congress, with a focus on: "restructuring the economy, reforming the growth model, speeding up the process of industrialization and modernization". Among these most major solutions, it is worth to mention to the task of "facilitating the strong development of S&T, making S&T to really be the top national policy, be the most important motive to develop modern production force and knowledge economy, improving the productivity, quality, efficiency and competitiveness of the economy; protecting the environment and ensure national defense and security. By 2020, S&T of Vietnam will reach the development level of the ASEAN's leading group; by 2030, there will be some areas reached to the advanced level in the world". The 12th Congress of the Communist Party of Vietnam also clearly identified the need of innovation and development of national S&T capacities as: "to continue strongly and synchronously renovating the management mechanism, S&T management and organization, especially management mechanisms, investment methods and financial mechanisms... To concentrate investment on developing some S&T institutes, national universities, high tech parks and economic zones as learnt from some advanced models in the world" *(Document of the 12th National Party Congress, Central Party Office, Hanoi 2016, pp. 120, 123*).

In order to develop S&T serving for economic development in the context of modern market economy, one of the pathways applied by many countries is to learn experiences from leading countries. South Korea, for example, has been adopted the S&T development model of the United States and has completed its industrialization over only three decades and became an OECD member in 1996. Currently, South Korea is ready to support Vietnam in the same way that the country was received from the United States before. *The Vietnam-South Korea Joint Statement on 09th September 2013 stated*: "The two sides agreed that the development of S&T have an

important role for the sustainable development of Vietnam. The both sides applauded the signing of an agreement to establish the Vietnam-Korea Institute of Science and Technology (V-KIST), which was implemented as a project of the Korea International Cooperation Agency (KOICA) and agreed to cooperate to make the project become a successful model of development cooperation between the two countries".

1. Experiences on establishing Korea Institute of Science and Technology (KIST)

In the history of S&T development to serve for industrialization, the establishment of the KIST in 1966 marked a particularly important milestone in South Korea. In the meantime, the way in which the KIST was founded has retained many meaningful and practical lessons-learnt. Among these important lessons learned at the beginning of the KIST, some could be mentioned as followings:

1.1. Creating a favorable environment for science and technology to take root

In the 1960s, South Korea had many scientific research institutes. But, as noticed by Dr. Choi Hyung Sup, the first director of the KIST, "at that time no such institutes had researched on the manufacturing technologies that companies demanded... Atoms Energy Institute of Vietnam and the National Institute of Defense Sciences were the only two institutes that enabled to carry out some valuable research, but their research had still been far from reaching what the business desired". At that time, "only a few people understood the need of technologies for industrialization and knew where to obtain these technologies. In such a situation, all we need is somewhat that enables to connect the business and the academia. In other words, there should be an intermediary unit for selecting, introducing, acquiring and applying technologies". At the same time, "in addition to many other tasks, we need to change the science education system to ensure a sustained development of S&T. We have to replace the schemes of *education for understanding sciences* by *education for mastering sciences*. The existing educational approach may be helpful as teaching the learners the skills to answer the Yes/No questions, but it does not help them improve their phenomenal analysis capabilities or apply theories into practical goals" (*see also Bui Tat Thang, Kim Sang Tae, 2012, p. 153*).

Therefore, "the quantity-oriented education approach must be replaced by quality-oriented one. We need to build up an education foundation that equips the learners with the abilities to solve problems rather than help them

just get their degrees or other related stuffs. In order to do that, it is necessary to create a social environment in which S&T enables to take root - an environment in which all people must understand science and respect technologies and; to get that target, the President himself must lead the way in this endeavor" *(Bui Tat Thang, Kim Sang Tae, 2012, pp. 153-154).*

About the role of the former President of South Korea (Park Chung Hee) on the development of S&T in general and the development of the KIST in particular, Dr. Choi Hyung Sup recalled some very impressive events.

- For the need of a special law, specifically for the establishment of the KIST, which contained provisions on the regime of accounting that was not in accordance with the existing accounting regime, there were many opinions determinedly resist against the proposal. However, the President Park had resolutely committed to support and submitted it until getting the approval of the Congress. Thanks to this law, the implementation of the Institute's establishment was carried out without interruptions;
- For finding the location of the KIST, despite the non-cooperation of the Ministry of Agriculture and Forestry and the consideration of more than 30 sites in the central of Seoul, Leading Board of KIST had decided to take a place in Suburban area. But as soon as the President Park heard of the decision, he went to the Forest Experimental Institute in the accompany of the Minister of Agriculture, Mayor of Seoul City and Director of KIST and ordered to transfer for entire section owned by the Forest Experimental Institute for KIST. "Forest Experimental Institute is important", he said, "but KIST is more important for economic development". Later, KIST compromised by taking only about half of the area to keep up appearance to Minister of Agriculture and Forestry;
- On the issue of ensuring the mechanism and utilization of scientists working at the KIST at that time, KIST leaders defined some principles to ensure (i) the autonomy in research; (ii) the stable living conditions; and (iii) a wonderful research environment. The money factor cannot be underestimated, but it is further more important to enhance the social credibility of scientists so that they feel proud to carry out their mission and to ensure their stable living conditions. For this purpose, first of all, it is necessary to offer them housing and health insurance, which had not been available in Korea in this time period, and to facilitate the education of their children. Their wages were paid on a par with middle-class wages, although these wages were only a quarter of those they can be earned in the United States, because most of them graduated from the United States; however, these were three times higher than the highest level that the inland university professors could receive.

There was a lot of opposition to KIST's salary. Dr. Choi Hyung Sup recalled: "One day, I was summoned to the Office of President with the payroll of KIST researchers. President Park smiled and said: "I was reported that the payroll of most KIST researchers was higher than my salary!" I told him, "If you think this salary is unreasonable, you can reduce my salary, but you cannot do that to other people". After a moment, he said, "Keep it still" and stood up. Today, everyone knows that the salaries of professors are higher than those of the KIST researchers"".

These concrete examples mentioned above made Dr. Choi Hyung Sup to comment that: "It is clear that the President Park was one of the most important players in newly founded establishment of the KIST. President Park was keen on raising the social portfolio of the KIST. He visited the construction site of KIST to reward and motivate construction workers. During the three years after the establishment of KIST, he visited the Institute once a month to talk with researchers... These visits to KIST were not expensive or caused troubles to him, but their impact were enormously unimaginable. Naturally, the spirit of KIST researchers was extremely high; and government officials who were in charge of supporting KIST changed their mindset and attitudes towards the KIST. As Dr. Steven Dedijer stated in his dissertation titled *Underdevelopment of Science in Developing Countries*: "I come to the realization that developing countries can not develop S&T if the leader of the country does not take leadership on the frontline!"" *(Bui Tat Thang, Kim Sang Tae, 2012, pp. 166)*.

1.2. The knowledgeableness of market economy

Developing S&T to serve for industrialization, improvement of technological level of production requires researchers in the field of S&T to understand the operating principles of the market economy. On this point, it should not be ignorantly understood that scientists and scientific managers must directly do business or engage in trading. The core thing is that there requires a rationale way of thinking and approaching in a manner of market economy. Dr. Choi Hyung Sup recalled, "In April 1964, President Park invited the directors of national institutes to attend a celebratory party. In the party, President was happy to notify to the attendances of party on the record broken on wool-sweater export that reached $20 million. I replied him that: "This record is very much commendable. But how long do we have to stick to such items? Japan has exported $1 billion of electronic products. Where does this power come from? The answer is technological development! We must also develop technologies". Suddenly, President became thoughtful and seemed to think of something; his face frowned! Obviously, based on logical market-oriented thinking, it is unimportant in what products produced or how much

of their gross sales, but how these products produced, by what technologies, and how much profit can be obtained.

Logical market-oriented thinking is also reflected on the suitability and the actual conditions when choosing the types and directions of research while establishing the Institute. In the 1960s, KIST leaders asserted that the practical conditions did not allow South Korea to set up such a costly institute where field of research covered both basic and applied sciences. Establishing such an institute requires huge financial investments. Therefore, the focus was to create an institute which enables to study the technologies that the private businesses demanded. This was reason why the model of Bartell Institute of United States was chosen to be the "sponsor" and build up a close brotherhood partnership; which is a business-type institute that works on a contract basis and is capable of researching technologies to link directly to manufacturing industry, rather than other famous academic institute models.

The market approach on building KIST is also a worthy lesson. Generally, the logics of building a normal research institute are as the followings: (i) first and foremost, to achieve research results; (ii) then to find customers who will buy these research results. Meanwhile, the founders of KIST challenged to: (i) first, together with customer to choose research areas, and then (ii) to embark on the same research with these customers until receiving their contract payment. This approach was difficult at the beginning, but once rooted, the operation of the institute had a basis and mode of operation that was closely linked to the development of industry itself. When recalling back, everyone acknowledged contribution of KIST to South Korea's industrialization not only in terms of a number of research on production technologies that were productive and applicable to the economy with a variety of new and unique technologies, but also in terms of indirect and spillover effects, which were even more important than these tangible achievements that research projects achieved. Dr. Choi Hyung Sup commented that prior to the founding of the KIST, the concept of research and development did not exist in South Korea's industry; the plant construction and development of needed technologies entirely depended on foreign companies in the form of turnkey contracts. As the scope of KIST's services on research and development was broadened, business perceptions on the importance of research and development was also increased, thereby contributing to the creation of an atmosphere and environment that was suitable for the voluntary development of technologies and the increase in collaboration between research institutes. Therefore, one of most important contributions of KIST to South Korea's industrialization was to help the

enterprises realize the fact that research and development is the basis to get profit in their business.

In addition, KIST's successful experience has created a turning point for modernizing other research institutes when taking KIST as a model, such as Korea Advanced Institute of Science and Technology (KAIST), Korea Atomic Energy Research Institute and many other institutes that later detached from KIST. Even South Korea's leading policy research institute, Korea Development Institute (KDI), was formed and operated based on this successful experience.

1.3. Employment and talent recruitments

One of the other important lessons is to learn how to mobilize competent researchers. At the time of 1966-1967, the founders of KIST recruited both national and international academic talents, especially Korean scholars in United States and Europe. Dr. Choi Hyung Sup recounted that he came to United States to interview 78 applicants selected from more than 500 applicants, three times of interview for each candidate with the attendance of the experts of Bartell Institute.

Initially, he selected 18 researchers, who had more than 5 years of experience after achieved their Ph.D degrees; later, more of 35 researchers were selected and all were sent to the Bartell Institute with the goal of not to increase their knowledge of the subjected area but to learn how to do business, with the notion that “in the end of day, the researcher must learn how to build up research plans that are likely to attract entrepreneurs to receive research orders from them”.

The special fact of KIST model is that it creates a momentum for the repatriation of a large number of outstanding Korean scientists and specialists from abroad, as well as laying the foundations for S&T, as well as national industry. For developing countries, tackling brain drain is always an urgent and difficult task. But with KIST model, South Korea is perhaps the only successful case of repatriation. As recorded in the documentary, in 1975, a female American student, Harriet Ann Hentgres, received a Ph.D with a thesis titled as “The repatriation and Usage of Higher-Level Intellectual Human Resources: Case Studies of KIST” at Johns Hopkins University, which noted that South Korea was the first developing country to overcome the brain drain that all countries had been experiencing.

After its formation, KIST has rapidly grown and made a positive contribution to the development of South Korea's S&T. KIST's core activities include survey and analysis projects, technical service activities and short-term and long-term R&D projects as requested by government and

business. From its inception period (1966) to 1976, KIST has completed more than 1,200 research tasks. Almost all projects have been successful. One reason for this success was that most projects involve technology transfer from advanced countries which was proven with commercial success and carefully selected by KIST with the belief that results of research efforts would determine the top importance of the contract-type research organizations in developing countries. Short-term R&D activities firstly aimed at replacing imports and increase exports based on technologies that are available in the country. Some R&D results were, for example, silicate calcium brick (1968), printable electric circuit boards (1968), seamless copper tubes (1969), electronic pocket calculators (1971), f Red ginseng processing technique (1971); synthesized ethanebutol as a remedy for tuberculosis (1970); Cordierite Refractory material (1976); Steel Tubing Copper Coil (1977)... Long-term applied R&D activities address issues that are expected to emerge in the future. For example, research and development on silicon steel plate production began in 1968 and was intensified in 1975-1976 with the support of additional research funds. KIST initiated the development of fluorocarbon technology in 1970. The plant for the production of Freon 12 was built and operated based on this technology. The research was further developed with the goal of mass production of other fluorocarbon products.

The impact of KIST is also reflected in the spillover to other socio-economic sectors. The first effect is on the private sector. Before the foundation of KIST, domestic R&D activities are rarely recognized; and most of the projects on industrial development relied on imported technologies as key elements. But when KIST came into operation, the domestic industry has acknowledged the significance and importance of R&D, thus establishing an environment and role model in which industrial enterprises jointly volunteered to cooperate with KIST to develop technological capabilities.

In this process, the visual effect of research results must be recognized as a major contribution to the process of national industrialization. KIST, with its leading role, has received active support from the government through the adoption of the Industrial Technology Promotion Law, grants, loans and tax exemptions, thereby encouraging new partnerships between the government, businesses and research institutions.

Moreover, KIST has had many contributions to government policy making with its functions as part of national creative responsibility by engaging in short-term and long-term development plans such as “Long-term prospects for S&T development” (1967), “Supply and Demand for Long-Term Energy” (1967), “Measures to support the electronics industry” (1969),

"Pohang Integrated Steel Plant Project" (1969-1975)... And perhaps, the most important contribution is that KIST has been a model for the formation and operation of a research institute in the industrialization process of a market economy.

KIST is considered to be a good example of the establishment and operation of industrial research institutions in developing countries. Accordingly, it shows a rational management model for other research institutions that already exist and shall be formed in Korea. An operational system approved itself in advanced countries was introduced and adjusted to South Korea's conditions and constraints. The activities of KIST have been supported by a special law that ensures maximum autonomy and stability in research. In other words, all activities including organization through planning, and programming and management of research projects, human resources management, computing and even management of required requirements were directed to ensure the maximization of research performance. The satisfactory results achieved by KIST have become productive tools for the establishment of other next research institutions such as KAIST, KDI, and KAERI; all of which are located in the Science Park of Seoul City. The special characteristics of these research institutions are the establishment of full legal status with financial support in the form of endowment funds, free provision of national assets, and independent audit system as well as the contract-based research work of the researchers.

Other research institutes currently operate in priority industries such as the Korea Shipbuilding Research Institute, Mechanical Engineering Research Institute, Chemical Research Institute, Korea Institute of Electronics Technology, Korea Standards Research Institute, Korea Energy Research Institute, and Korea Telecommunications Research Institute... All of these institutes have benefited from the good practice of KIST in terms of operations and organization, as well as technology knowledge and research experience that KIST accumulated through its activities. Thus, the factor that constitutes a model for linking scientific research with technological development on production, which is appropriate to the period of accelerated industrialization in the context of market economy, is the remarkable contribution that KIST model has provided many attractive lessons for many countries.

2. Issues on the establishment of the V-KIST in Vietnam

For those who are interested in Vietnam's industrialization and modernization, what is included in the Vietnam-Korea Joint Statement signed on 9th September 2013 on the "Establishment of Vietnam-Korean Institute of Science and Technology V-KIST", implemented as a project of Korea Cooperation Agency (KOICA) and agreed to cooperate to make this

project a successful model of development cooperation between the two countries", truly is a pleasure with many great expectations. However, as the experience on the establishment of the KIST, in order to fulfill this task, the process of building V-KIST will surely have to address a number of specific problems, in terms of mindset thinking, legal aspects, as well as other purely technical issues. However, with the direct support of KIST staffs, we have faith in the belief that these obstacles (if any) will be resolved in the fastest and most effective way. Whether the pathway to build V-KIST lasts in a long or short period would mainly depend upon the Vietnamese side.

The concrete experience for establishing the KIST of South Korea in the late 1960s can be summarized as:

- The political will of the country's leaders is of prime importance;
- The social environment in which S&T can take root is a necessary condition;
- The role of head of KIST is indispensable;
- Scientists are put in the right social place as they should be.

These are lessons learned half a century ago and in nowadays context, one could raise an opinion that these lessons would be no longer (or not completely) right. But we still believe that the spirit of these lessons is still remained a worthy reference. Therefore, with the aim at developing V-KIST in the fastest and most effective pathway, we would like to mention a few suggestions and recommendations as the followings:

- Firstly, National Council for the establishment of V-KIST should be formed (including senior leaders, policymakers, scientists from many ministries) to carry out some following tasks:
  + Carrying out a pre-feasibility study for the establishment of the V-KIST: Currently, some draft reports on V-KIST Project have been available, among which a version prepared by KIST has identified in details on the fields of S&T that should be prioritized in research. These analyzes have taken into consideration of the existing strengths of Vietnam, the tendency for economic development and S&T in the world and the ability to create competitive advantage... which can serve as a basis for discussion of the V-KIST's establishment. Nevertheless, the report should pay special attention to the principles of management, operation and mechanisms that bring research results into industrial production as well as the direction of market development of the research results;
  + Drafting on the Special Law on the establishment of V-KIST. This was actually a practical experience of KIST's establishment process itself. In case those current regulations on accounting, organization, human

resources... are sufficient in the level of openness and appropriateness, which are in compatible with other modern market economies (in line with international practice) for the optimal implementation of V-KIST, it is not necessary to develop this kind of law. In case of not reaching such level, it is necessary to have a special legal regulation (preferably a law or ordinance), to have a legal basis for the establishment of V-KIST;

+ Deciding on the location and scale of V-KIST: V-KIST is expected to be built at Lang-Hoa Lac Hi-Tech Park (Hanoi). Regarding to this, it seems that V-KIST has been more favorable than KIST was before;

+ Assigning the first director of the V-KIST: Experience on the establishment of KIST showed that this is a critical issue for the success of V-KIST's establishment, particularly in terms of early orientation to operation and persistence to maintain the bridging mission between science and industry. In the current context, we believe that the first director of V-KIST should meet the three following criteria: *first*, to be devoted to scientific development rather than considering the establishment of V-KIST as a conventional project; *second*, to have scientific reputation to recruit local and international scientists for V-KIST; and *third*, to perform a deep understanding of market economy to perceive how to organize the operation of the V-KIST in the market mechanism;

- Examining specific methods when building KIST to select appropriate forms and steps;
- From the lessons of building the KIST as a model for bridging between scientific research and technological development for production in order to promote industrialization in the market economy condition, at the current period, the establishment of V-KIST should be considered as one of the truly, practical and strategic breakthroughs in the field of S&T./.

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