R&D Supports for Korean Small and Medium Size Companies through University-Industry Cooperation

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Abstract

This paper provides an overview of the R&D Supporting Program by KAIARI (Korea Association of Industry, Academy, and Research Institute) for Korean Small and Medium Size Companies through University-Industry Cooperation. The background of establishing the KAIARI 18 years ago is introduced along with the specific programs and more detailed achievements of the R&D supporting programs. The Korean small and medium size companies, which consist of 99.9% among the number of companies in Korea, generally lack of the high level of engineers and the expensive test and measurement equipments. The effective cooperative system developing the R&D products and systems between university and industry becomes the hot issue and an essential element to maximize the international competitiveness in each nation. It is now generally understood as the best way to compensate the weakness of the industry and/or the academy by the strength of the academy or/and the industry. The current R&D supporting programs of KAIARI are (1) Cooperative Research & Development Project, (2) Project of Setting Up New Research Institute of Company, and (3) Project of Utilizing Expensive R&D Equipments at University. The contents and the outputs of those three projects are introduced and the R&D supporting programs of KAIARI have been also evaluated as one of the successful programs among various governmental R&D programs.

Keywords: University-Industry Cooperation, Small and Medium Size Companies, Korea Association of Industry, Academy, and Research Institute, Agency of Small & Medium Business

Introduction

The small and medium size companies in Korea consist of 99.9% in the number of companies, 86% in the number of employees, and more than 50% in the amount of total revenue. Because of these economic importance of small & medium size companies, the Korean government (The Agency of Small & Medium Business, ASMB) has provided those weak companies with the special R&D supports through university-industry cooperation since 1993. The KAIARI, replacing the direct supports by ASMB, has been operated since 2005 and evaluated as one of the most successful R&D supporting programs in Korea. The university-industry cooperation program of ASMB and KAIARI has supported a total of 28,115 R&D projects during the past 18 years old. There are presently three R&D supporting main programs, whose total budget of central government (ASMB) became around 120 million US dollars this year. The current R&D supporting programs of KAIARI are (1) Cooperative Research & Development Project, (2) Project of Setting Up New Research Institute of Company, and (3) Project of Utilizing Expensive R&D Equipments of the University. The participating S&M size companies add also their matching fund to each project amounting 25% of KAIARI' supports. The board of directors of KAIARI are 17 representatives of regional (16 special cities and provinces, 1 research institute association) KAIARI's and 8 CEO's of private companies. More than 2,000 professors and researchers from 220 universities and 23 research institutes participated at the KAIARI R&D supporting programs to help 2,300 S&M size companies to develop their new products, process, and systems.
Background

The purpose of initiating the governmental R&D supporting programs for the S&M industry 19 years ago was to contribute for the national development by strengthening its economic competitiveness. The advancement of national competitiveness was strongly believed to be depending upon the rapid growth of S&M size companies, which consist of 99.9% in the number of companies and 88% in the number of employees in Korea. The R&D supports through university-industry cooperation was to advance the level of technology and R&D activities of S&M size companies.

In order to carry out the R&D supports for the S&M industry, the consortium of industry-university-research institute (The Korea Consortium Committee of University, Industry, and Research Institute) was formed in 1993 and it was officially registered as a corporation aggregate in 1998. The government (ASMB) designated it as the exclusive organization for the R&D supporting programs for S&M size companies through the university-industry-research cooperation in 2005. The consortium of industry-university-research institute launched four cooperation programs, which are Cooperative Research & Development Project (March 2006-present), Project of Setting Up New Research Institute of Company (July 2005-present), Project of Utilizing Expensive R&D Equipments at University (March 2007-present), and University-Industry Cooperation Laboratory (March 2006-February 2009). The name of corporation aggregate was changed to the current one, the Korea Association of Academy, Industry, Research Institute, KAIARI, in 2009.

The KAIARI has 25 full time staff members who coordinate and manage its three important R&D projects and support the national university-industry network including the 17 regional KAIARI associations. It will do any government requested projects to advance the level of technology of S&M size companies. It will also do R&D planning, data collections, survey and research, university-industry cooperation related national policy study, and the international R&D cooperation.

Program Overview

There are three current R&D supporting programs of KAIARI through industry-academy – research institutes such as (1) Cooperative Research & Development Project, (2) Project of Setting Up New Research Institute of Company, and (3) Project of Utilizing Expensive R&D Equipments of the University.

The first Cooperative R&D Project consist of the regional program which has a matching fund from the local government (provinces or special cities) and national/international program which does not need to have the regional matching funds. The regional program aims for the S&M companies whose average revenue is around two million US dollars and their business operation period is less than 7 years. The national and international project is for the S&M companies whose average revenue is between 2 million US dollars and 50 million US dollars and their business operation period is more than 7 years. Among the regional and national projects, there are the designated public offering projects proposed by industry, which include the green technology and new growth power industry. The selected companies may have the right to choose the university or/and the research institutes to cooperate for the designated project.

The second Project of Setting Up New Research Institute of Company is for the S&M companies who are not able to found their research institutes by themselves. The S&M companies lack of high level of engineers and the expensive and high precision test equipments. They must also provide the R&D engineers with the high level of salary. In order for the R&D outputs to be related to the production of revenue, there must be a process of commercialization. The company needs at least a year for commercialization depending upon the technology. Even though there might be no problems with high salary, it is further difficult for the S&M industry, who most of the time lack of money, to invest on cost and time. The Project of Setting Up New Research Institute is to solve those issues of S&M companies through university-industry cooperation. The KAIARI is financially supporting the maximum of 5 million US dollars for two
years and the companies are able to spend it to set up and maintain the research institutes, and do their own R&D projects.

The third Project of Utilizing Expensive R&D Equipments of the University is both for reducing the idling time of expensive equipments of the university and solving the shortage problems of equipments of S&M companies. The selected companies may request for usage of the high expensive equipments which university or research institutes own and also allow them to be used by the industry people at much cheaper cost. There are 127 universities and research institutes participated in the KAIARI Project and around 8000 expensive equipments throughout the nation are presently registered and to be used by the industry engineers. The KAIARI may financially support 60% of equipment usage cost or the maximum of 50,000 US dollars.

**Outputs of Program**

The Cooperative R&D Project consist of the regional program which has a matching fund from the local government (provinces or special cities) and national/international program which does not need to have the regional matching funds. There had been a total financial supports, 540 million US dollars, during the past 18 years from 1993 to 2010. The average number of participating universities and research institutes per year is around 200 and the total number of 30,927 companies had been supported by them. The 7000 patents' registration, 19,000 pilot item development, and 17,000 revised processes have been also achieved during that period. The Project of Setting Up New Research Institute of Company at the University helped professors and the companies to open the 1,903 new R&D institutes and create 2,459 jobs with the financial supports of 120 million US dollars since 2005. The average 96.7% of participating companies shorten their R&D time, that is approximately 6 to 11 months, through the university and industry cooperation.

The number of patent property right of the Project of Setting Up New Research Institute of Company at the University is 2.2 per 0.1 million US dollars and 1.22 per a company. The economic output of the Cooperative R&D Project per 0.1 million US dollars is 7.3 million US dollars and the same economic output of the Project of Setting Up New Research Institute of Company at the University per 0.1 million US dollars is 3.2 million US dollars. The number of jobs being created per 0.1 million US dollars is 7.15 for the Project of Setting Up New Research Institute of Company at the University and is 6.58 for the Cooperative R&D Project. It is also surveyed that the participating companies continue to spend their own R&D expense and assign more R&D man power even after the end of the financial supports by KAIARI and ASMB. The average more R&D expense and man power of the Cooperative R&D Project is 60,000 US dollars and 1.8 people respectively. The average more R&D expense and man power of the Project of Setting Up New Research Institute of Company at the University is 0.11 million US dollars and 2 people as well.

The Project of Utilizing Expensive R&D Equipments of the University has provided the average 1,400 companies per year with 33 million US dollars since 2007 and the expensive equipments were therefore used by the total 53,261 times. The number of developing prototypes per 0.1 million US dollars by KAIARI supports is 3.1. The number of patents and quality certifications are 1.53 and 0.85 respectively. The economic output per 0.1 million US dollars of KAIARI supports is 280,000 US dollars for revenue, 150,000 US dollars for exports, 40,000 US dollars for profits.

**Practical Engineers Needed for S&M Companies**

The jobless rate of young people in the age of 15-29 was reported as 7.2% at the end of 2010 in Korea according the Department of Statistics. The number of new employee was decreased by 1.5% (58,000 people) than the year before in 2010. The survey result by the Agency of Employment is that three out of 10 students are not able to decide their job after graduation even though they thought employment would be possible during their undergraduate studies. The 35.6% of students, which is the largest at the survey, answered for the reason why the education of university does not help them to decide their career is that the education is more theoretical than practical. The second largest group, 22.6%, is that their major courses are
further away from the real practices in the industry. The third one, 21.6%, is that the courses are not offered enough to practice their job after the graduation. The industry insists that they need more investment on training the new employee and it takes another 19.5 months before they are placed to their real positions. The cost of retraining one person is 60,000 US dollars and the total cost in the country was estimated as 2.1 billion US dollars. This is because that the main aim of the industry is for the profit and the university is for educating the people. The university is therefore not only to explore the future knowledge but educate the practical engineers who are needed by the industry. The R&D supporting programs through university-industry cooperation have been evaluated as one of the best programs to shorten these big gaps.

References

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Biography

Dr. Kwang Sun Kim is presently the Chairman of Korea Association of Industry, Academy, and the Research Institutes (KAIARI) and a professor of School of Mechatronics Engineering, Korea University of Technology and Education (KUT). He initiated founding the Korea Society for Semiconductor Equipment Society, whose current registered members are more than 1000, in 2010 and served for the Society as a Chairman for four years from 2003 to 2007. He also served as a dean of planning affairs of KUT from 1996 to 2000, and as a dean of graduate school of KUT during 2000-2002 and 2004-2006. Before he joined KUT as an assistant professor in 1992, Dr. Kim had various experiences in working at the Ministry of Defense of Korea during 1978-1984 as a deputy section chief, at Yale University as a research faculty in 1988, both at Gibbs and Hill Inc., USA, and at Samsung Aerospace Inc. as a system engineer from 1986 to 1992. He was awarded the National Medal by the President of Korea for his contributions to scientific and technological fields in 2006. Dr. Kim was also nominated by the American Society of Mechanical Engineers as a fellow of ASME in 2007 and is presently an auditor of international collaboration of Korea Society for Engineering Education (KSEE). He has been a chair of Semiconductor Equipment Commercialization Committee of Korean Semiconductor Association from 2006 to 2009. He is presently a member of SEMI International Standard Committee and was awarded the Distinguished Engineering Service Award by the School of Engineering, University of Kansas in 2009. Dr. Kim received B.S. degree in Mechanical Engineering from Hanyang University (1978), M.S. (1983) and Ph.D. (1986) degrees in Mechanical Engineering from the University of Kansas, USA.