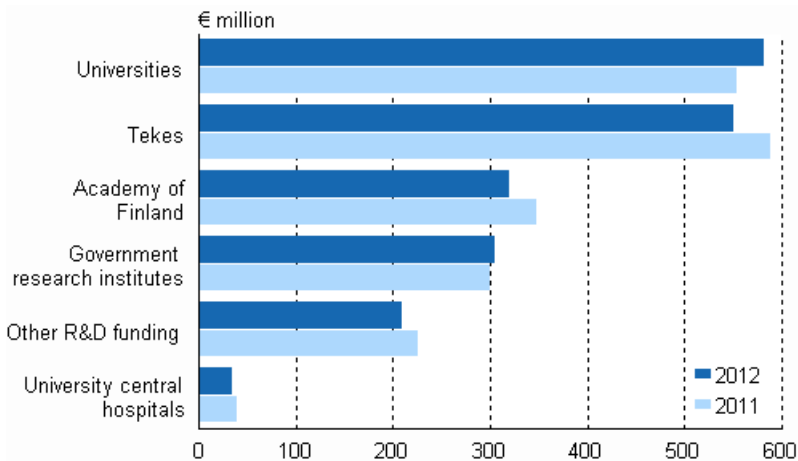


Finland's Technology Innovation System

I. Introduction

When, Finland, this country comes to our minds, it is quite easy for us to associate with the prestigious cell-phone company "NOKIA", and its unbeatable high technology communication industry. However, following the change of entire cell-phone industry, the rise of smart phone not only has an influence upon people's communication and interaction, but also makes Finland, once monopolized the whole cell-phone industry, feel the threat and challenge coming from other new competitors in the smart phone industry. However, even though Finland's cell-phone industry has encountered frustrations in recent years in global markets, the Finland government still poured many funds into the area of technology and innovation, and brought up the birth of "Angry Birds", one of the most popular smart phone games in the world. The Finland government still keeps the tradition to encourage R&D, and wishes Finland's industries could re-gain new energy and power on technology innovation, and indirectly reach another new competitive level.

According to the Statistics Finland, 46% Finland's enterprises took innovative actions upon product manufacturing and the process of R&D during 2008-2010; also, the promotion of those actions not merely existed in enterprises, but directly continued to the aspect of marketing and manufacturing. No matter on product manufacturing, the process of R&D, the pattern of organization or product marketing, we can observe that enterprises or organizations make contributions upon innovative activities in different levels or procedures. In the assignment of Finland's R&D budgets in 2012, which amounted to 200 million Euros, universities were assigned by 58 million Euros and occupied 29% R&D budgets. The Finland Tekes was assigned by 55 million Euros, and roughly occupied 27.5% R&D budgets. The Academy of Finland (AOF) was assigned by 32 million Euros, and occupied 16% R&D budgets. The government's sectors were assigned by 3 million Euros, and occupied 15.2% R&D budgets. Other technology R&D expenses were 2.1 million Euros, and roughly occupied 10.5% R&D. The affiliated teaching hospitals in universities were assigned by 0.36 million Euros, and occupied 1.8% R&D budgets. In this way, observing the information above, concerning the promotion of technology, the Finland government not only puts more focus upon R&D innovation, but also pays much attention on education quality of universities, and subsidizes various R&D activities. As to the Finland government's assignment of budgets, it can be referred to the chart below.



Source: Statistics Finland

As a result of the fact that Finland promotes industries' innovative activities, it not only made Finland win the first position in "Growth

Competitiveness Index" published by the World Economic Forum (WEF) during 2000-2006, but also located the fourth position in 142 national economy in "The Global Competitiveness Report" published by WEF, preceded only by Swiss, Singapore and Sweden, even though facing unstable global economic situations and the European debt crisis. Hence, observing the reasons why Finland's industries have so strong innovative power, it seems to be related to the Finland's national technology administrative system, and is worthy to be researched.

II. The Recent Situation of Finland's Technology Administrative System

A. Preface

Finland's administrative system is semi-presidentialism, and its executive power is shared by the president and the Prime Minister; as to its legislative power, is shared by the Congress and the president. The president is the Finland's leader, and he/she is elected by the Electoral College, and the Prime Minister is elected by the Congress members, and then appointed by the president. To sum up, comparing to the power owned by the Prime Minister and the president in the Finland's administrative system, the Prime Minister has more power upon executive power. So, actually, Finland can be said that it is a semi-presidentialism country, but trends to a cabinet system.

Finland technology administrative system can be divided into four parts, and the main agency in each part, based upon its authority, coordinates and cooperates with making, subsidizing, executing of Finland's technology policies. The first part is the policy-making, and it is composed of the Congress, the Cabinet and the Research and Innovation Council; the second part is policy management and supervision, and it is led by the Ministry of Education and Culture, the Ministry of Employment and the Economy, and other Ministries; the third part is science program management and subsidy, and it is composed of the Academy of Finland (AOF), the National Technology Agency (Tekes), and the Finnish National Fund Research and Development (SITRA); the fourth part is policy-executing, and it is composed of universities, polytechnics, public-owned research institutions, private enterprises, and private research institutions. Concerning the framework of Finland's technology administrative, it can be referred to below.

B. The Agency of Finland's Technology Policy Making and Management

(A) The Agency of Finland's Technology Policy Making

Finland's technology policies are mainly made by the cabinet, and it means that the cabinet has responsibilities for the master plan, coordinated operation and fund-assignment of national technology policies. The cabinet has two councils, and those are the Economic Council and the Research and Innovation Council, and both of them are chaired by the Prime Minister. The Research and Innovation Council is reshuffled by the Science and Technology Policy Council (STPC) in 1978, and it changed name to the Research and Innovation Council in Jan. 2009. The major duties of the Research and Innovation Council include the assessment of country's development, deals with the affairs regarding science, technology, innovative policy, human resource, and provides the government with aforementioned schedules and plans, deals with fund-assignment concerning public research development and innovative research, coordinates with all government's activities upon the area of science, technology, and innovative policy, and executes the government's other missions.

The Research and Innovation Council is an integration unit for Finland's national technology policies, and it originally is a consulting agency between the cabinet and Ministries. However, in the actual operation, its scope of authority has already covered coordination function, and turns to direct to make all kinds of policies related to national science technology development. In addition, the consulting suggestions related to national scientific development policies made by the Research and Innovation Council for the cabinet and the heads of Ministries, the conclusion has to be made as a "Key Policy Report" in every three year. The Report has included "Science, Technology, Innovation" in 2006, "Review 2008" in 2008, and the newest "Research and Innovation Policy Guidelines for 2011-2015" in 2010.

Regarding the formation and duration of the Research and Innovation Council, its duration follows the government term. As for its formation, the Prime Minister is a chairman of the Research and Innovation Council, and the membership consists of the Minister of Education and Science, the Minister of Economy, the Minister of Finance and a maximum of six other ministers appointed by the Government. In addition to the Ministerial members, the Council shall comprise ten other members appointed by the Government for the parliamentary term. The Members must comprehensively represent expertise in research and innovation. The structure of Council includes the Council Secretariat, the Administrative Assistant, the Science and Education Subcommittee, and the Technology and Innovation Subcommittee. The Council has the Science and Education Subcommittee and the Technology and Innovation Subcommittee with preparatory tasks. There are chaired by the

Ministry of Education and Science and by the Minister of Economy, respectively. The Council's Secretariat consists of one full-time Secretary General and two full-time Chief Planning Officers. The clerical tasks are taken care of at the Ministry of Education and Culture.

(B) The Agency of Finland's Technology Policy Management

The Ministries mainly take the responsibility for Finland's technology policy management, which includes the Ministry of Education and Culture, the Ministry of Employment and Economy, the Ministry of Social Affairs and Health, the Ministry of Agriculture and Forestry, the Ministry of Defense, the Ministry of Transport and Communication, the Ministry of Environment, the Ministry of Financial, and the Ministry of Justice. In the aforementioned Ministries, the Ministry of Education and Culture and the Ministry of Employment and Economy are mainly responsible for Finland national scientific technology development, and take charge of national scientific policy and national technical policy, respectively. The goal of national scientific policy is to promote fundamental scientific research and to build up related scientific infrastructures; at the same time, the authority of the Ministry of Education and Culture covers education and training, research infrastructures, fundamental research, applied research, technology development, and commercialization. The main direction of Finland's national scientific policy is to make sure that scientific technology and innovative activities can be motivated aggressively in universities, and its objects are, first, to raise research funds and maintain research development in a specific ratio; second, to make sure that no matter on R&D institutions or R&D training, it will reach fundamental level upon funding or environment; third, to provide a research network for Finland, European Union and global research; fourth, to support the research related to industries or services based upon knowledge-innovation; fifth, to strengthen the cooperation between research initiators and users, and spread R&D results to find out the values of commercialization, and then create a new technology industry; sixth, to analyze the performance of national R&D system.

As for the Ministry of Employment and Economy, its major duties not only include labor, energy, regional development, marketing and consumer policy, but also takes responsibilities for Finland's industry and technical policies, and provides industries and enterprises with a well development environment upon technology R&D. The business scope of the Ministry of Employment and Economy puts more focus on actual application of R&D results, it covers applied research of scientific technology, technology development, commercialization, and so on. The direction of Finland's national technology policy is to strengthen the ability and creativity of industries' technology development, and its objects are, first, to develop the new horizons of knowledge with national innovation system, and to provide knowledge-oriented products and services; second, to promote the efficiency of the government R&D funds; third, to provide cross-country R&D research networks, and support the priorities of technology policy by strengthening bilateral or multilateral cooperation; fourth, to raise and to broaden the efficiency of research discovery; fifth, to promote the regional development by technology; sixth, to evaluate the performance of technology policy; seventh, to increase the influence of R&D on technological change, innovation and society; eighth, to make sure that technology fundamental structure, national quality policy and technology safety system will be up to international standards.

(C) The Agency of Finland's Technology Policy Management and Subsidy

As to the agency of Finland's technology policy management and subsidy, it is composed of the Academy of Finland (AOF), the National Technology Agency (Tekes), and the Finnish National Fund Research and Development (SITRA). The fund of AOF comes from the Ministry of Education and Culture; the fund of Tekes comes from the Ministry of Employment and Economy, and the fund of SITRA comes from independent public fund supervised by the Finland's Congress.

(D) The Agency of Finland's Technology Plan Execution

As to the agency of Finland's technology plan execution, it mainly belongs to the universities under Ministries, polytechnics, national technology research institutions, and other related research institutions. Under the Ministry of Education and Culture, the technology plans are executed by 16 universities, 25 polytechnics, and the Research Institute for the Language of Finland; under the Ministry of Employment and Economy, the technology plans are executed by the Technical Research Centre of Finland (VTT), the Geological Survey of Finnish, the National Consumer Research Centre; under the Ministry of Social Affairs and Health, the technology plans are executed by the National Institute for Health and Welfare, the Finnish Institute of Occupational Health, and University Central Hospitals; under the Ministry of Agriculture and Forestry, the technology plans are executed by the Finnish Forest Research Institute (Metla), the Finnish Geodetic Institute, and the Finnish Game and Fisheries Research Institute (RKTL); under the Ministry of Defense, the technology plans are executed by the Finnish Defense Forces' Technical Research Centre (Pvtt); under the Ministry of Transport and Communications, the technology plans are executed by the Finnish Meteorological Institute; under the Ministry of Environment, the technology plans are executed by the Finnish Environment Institute (SYKE); under the Ministry of Financial, the technology plans are executed by the Government Institute for Economic Research (VATT). At last, under the Ministry of Justice, the technology plans are executed by the National Research Institute of Legal Policy.