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Knowledge Sharing Program

2014/15 Knowledge Sharing Program with Hungary:

Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub II

MINISTRY OF STRATEGY AND FINANCE

KDI Korea Development Institute

2014/15 Knowledge Sharing Program with Hungary

2014/15 Knowledge Sharing Program with Hungary

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2014/15 Knowledge Sharing Program with Hungary:

Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub Ⅱ

MINISTRY OF STRATEGY AND FINANCE

KDI Korea Development Institute

Preface

In the 21st century, knowledge is one of the key determinants of a country's level of socioeconomic development. Based on this recognition, Korea's Knowledge Sharing Program (KSP) was launched in 2004 by the Ministry of Strategy and Finance (MOSF) and the Korea Development Institute (KDI).

KSP aims to share Korea's experience and knowledge with the partner countries to achieve mutual prosperity and cooperative partnership. Former high-ranking government officials are directly involved in the policy consultation to share their intimate knowledge of development challenges and to complement the analytical work of policy experts and specialists who have extensive experience in their fields. The government officials and practitioners effectively pair up with their counterparts in the development partner countries to work jointly on pressing policy challenges and share development knowledge in the process. The program includes policy research, consultation, and capacity-building activities, all to provide comprehensive tailor-made assistance to the development partner countries in building a stable foundation and fostering capabilities to pursue self-sustainable growth.

In 2014, policy consultation and a capacity building-workshop were carried out with 29 partner countries covering more than 100 research agendas. As new partner countries, Kyrgyz Republic, El Salvador, Guatemala, and Cuba were selected in consideration of the countries' policy demands, growth potential, and strategic economic partnership.

The 2014/15 Knowledge Sharing Program with Hungary was carried out with the goal to exchange the socioeconomic development experience of the two countries for improving Hungary's policymaking capacity and achieving socioeconomic development. Under the MOU signed between the Ministry of Strategy and Finance of Korea and the Ministry for National Economy of Hungary, the KSP team conducted joint research and seminars in order to support the establishment of the "Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub II."

I would like to take this opportunity to express my sincere gratitude to Senior Advisor Mr. Dae-won Suh, Project Manager Professor Wook Sohn, as well as the project consultants including Professor Minsik Choi and Professor Sung Jin Kang for their immense efforts in successfully completing the 2014/15 KSP with Hungary. I am also grateful to Executive Director Dr. Si Wook

Lee, Former Executive Director Dr. Hong Tack Chun, Program Director Dr. Changyong Choi, Program Officer Ms. Sujin Park, and all the members of the Center for International Development, KDI for their hard work and dedication to this program. Last, I extend my warmest thanks to the Hungarian counterparts, the Ministry of Foreign Affairs and Trade, the Ministry for National Economy, and other related agencies, program coordinators, and participants for showing active cooperation and great support.

In your hands are the results of the 2014/15 KSP with Hungary. I believe that KSP will serve as a valuable opportunity to elevate Hungary and Korea's mutual economic cooperation to a new level. I sincerely hope the final research results on the selected areas can be fully used to support Hungary in achieving its economic development goal in the near future.

Joon-Kyung Kim
President
Korea Development Institute

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2014/15 KSP with Hungary

Sujin Park (Program Officer, Korea Development Institute)

The Knowledge Sharing Program (KSP) with Hungary was first launched in 2013 following a mutual agreement between Hungary and Korea with the theme "Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub." The KSP with Hungary has a special meaning considering the economic status itself, as Hungary is neither an ODA recipient country nor a low-income country, but an upper-middle-income country with OECD and EU membership. The joint study and ownership were enhanced and emphasized in implementing the research under the close cooperation of both countries. This also aimed to foster a mutually beneficial relationship by providing practical and concrete policy suggestions.

Policy consultation for the 2014/15 KSP with Hungary was implemented under the consecutive theme "Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub Ⅱ." It consists of three research topics selected in accordance with priority demands of the Hungarian government. As an implementing organization, the Korea Development Institute (KDI) gathered a group of experts. Table 1 lists the three consultation areas and researchers for the 2014/15 KSP with Hungary.

Strategy for Crisis Management and Economic Development Policy for the Future Central European Knowledge-based Hub Ⅱ	
Senior Advisor: His Excellency Dae-won Suh(Former Ambassador to Hungary) Project Manager: Dr. Changyong Choi(KDI)	
Consultation topics	**Researchers**
Establishing a Rating Institution for Evaluating the Competitiveness and Risks of Enterprises	Prof. Wook Sohn (KDI School of Public Policy and Management, KDIS)/Project Manager Mr. Balazs Laki(Ministry of Foreign Affairs and Trade)
Public Employment and Vocational Training System for the Effective Use of Human Resources	Prof. Minsik Choi (Ewha Womans University) Ms. Katalin Ordódy-Zoltán(Ministry for National Economy, MNE) Ms. Gabriella Tölgyes(MNE)
New Growth-Driven Industry Policy and Ecofriendly Automotive Industry Policy under Global Megatrends	Prof. Sung Jin Kang (Korea University) Mr. Ádám Nagy (MNE)

The Korean delegation visited Budapest from January 11 to 16, 2015 to conduct a High-Level Demand Survey and Pilot Study. In the 2014/15 KSP kick-off meeting with the Hungarian government officials, the Korean delegation presented Korea's experience in relation to each topic. They had a separate meeting with the working groups to identify the current issues and problems that needed to be solved within the scope of KSP. Through intensive discussions, the Korean researchers were able to specify the policy consultation needs as well as collect research information and data.

The Korean delegation conducted an Additional Pilot Study from March 29 to April 5, 2015 to develop a research analysis and get useful advice from the Hungarian side. They held additional meetings with relevant ministries and organizations and, thus, gathered additional information for their research. Considering the time constraints and lack of program information, this stage provided an opportunity to ensure higher quality of the final consultation.

In the next stage, the Interim Reporting and Policy Practitioners' Workshop was held in Korea from May 3 to 9, 2015. Five Hungarian officials headed by Rita Hévei, Head of Secretariat of the Administrative State Secretary at the Ministry for National Economy, visited Korea for this occasion. In the Interim Reporting Workshop, Korean researchers presented their interim research findings and obtained feedback from the Hungarian delegation. In addition, the Hungarian delegation visited Korea Technology Finance Corporation, Busan Human Resources Development Institute,

Korea Enterprise Data, Hyundai Ulsan Plant, Seoul Employment Center, and Industrial Bank of Korea to meet Korean professionals and see firsthand examples of Korea's development experience.

From June 23 to 28, 2015, a Korean delegation led by Mr. Dae-won Suh, Former Ambassador to Hungary conducted the Senior Policy Dialogue and the Final Reporting Workshop in Budapest. The Korean delegation held the workshop to share the results of the 2014/15 KSP with Hungarian policymakers and officials. Based on the in-depth discussions, the Hungarian officials showed their interest in the project's results, performance, and further projects.

Executive Summary

Wook Sohn (KDI School of Public Policy and Management)

The 2014/15 KSP with Hungary was carried out under the MOU signed between the Ministry of Strategy and Finance of Korea and the Ministry for National Economy of Hungary in November 2013. The 2014/15 KSP with Hungary is the second year of cooperation through the program.

The Hungarian economy has undergone a double-dip recession since 2008. Under these circumstances, the government realized that the nation was not able to overcome the risk of crisis without resolving the structural problems of its economy. In response, the government pursued diverse structural reform. These policy efforts brought about a stable macroeconomic situation in Hungary, with improved domestic and overseas indicators compared to those during the 2008 financial crisis. Hungary was on a stable track towards growth.

However, in order to obtain long-term growth engines, it needs to pursue a growth model centered on domestic medium and small enterprises with high employment effects. In association with this growth model, the government is pursuing economic development strategies through industrial and employment policies by pushing ahead with future-oriented industrial policies, nurturing newly created technology companies, and increasing employment rates through job training of the underprivileged class.

The Ministry for National Economy of Hungary submitted a demand survey report based on topics helpful for Hungary's economic growth strategies.

Additionally, the research topics of the 2014/15 Hungarian KSP were identified as high policy priorities, forming the basic conditions that increase the possibility of being reflected in future policies.

In order to provide specific policy proposals, this report analyzes the current challenging tasks faced by Hungary. These tasks are addressed through discussions with local experts on each topic. In addition, knowledge exchanges on specific content and policy direction in relation to Korea's recent experiences are discussed. In particular, considering Hungary's history as a European power and its transition experiences, the policy experiences of Hungary after joining the Organization for Economic Cooperation and Development (OECD) and economic policies pursued by the current government were focused and consulted. As Hungary is a member of the OECD and European Union, the constraints it faces as a member of these two organizations are reflected in the consultation content, thereby increasing the awareness of the reality of policy consultation.

In addition, when the basic conditions or policy environment changed compared to the conditions when the demand survey was submitted, the changes were reflected in the revision process; in this process, the study topics became more concrete. Moreover, when the Hungarian experts visited Korea, the issues raised when consulting with the visited organization were included in the final report. Throughout the entire project, the detailed content was continuously fine-tuned, with necessary content added as it surfaced. Maintaining the original topic framework, while writing the policy advice report to accommodate the demand maximally, is expected to meet both nations' standards considerably.

The 2014/15 KSP with Hungary entitled "Strategy for Economic Development Policy for the Future Central European Economic Hub" covers three key policy areas:(1) Establishing a Rating Institution for Evaluating the Competitiveness and Risks of Enterprises, (2) Public Employment Service and Vocational Training System for Effective Management of Human Resources, and (3) New Growth-Driven Industry Policy and Ecofriendly Automotive Industry Policy under Global Megatrends. Our findings and policy recommendations for each policy area are summarized as follows.

1. Establishing a Rating Institution for Evaluating the Competitiveness and Risks of Enterprises

Hungary has made progress in catching up with high-income OECD member countries in many aspects. However, the innovation and performance levels still show room for improvement. To strengthen Hungary's research and development (R&D) capabilities, the entire innovation system, including innovation assessment

and the financial support system for innovative firms, must be analyzed.

Access to financing resources is a problem for Hungarian small and medium-sized enterprises (SMEs). A significant proportion of these enterprises cannot obtain sufficient external financing for their operations because of poor credit history and lack of experience. Although government and central bank stimulation programs may help established enterprises, these programs appear to have no significant effect on newly created enterprises. The programs supported by the European Union (EU) also attempt to assist SMEs but are designed to support mid-size businesses with small credit risk and are not suitable for start-up SMEs equipped with innovative technologies.

Limited funds can be distributed efficiently only when the beneficiary enterprises are assessed correctly. Thus, when policy financing is provided, assessment systems for enterprises and technologies should be discussed simultaneously. Currently, no models or institutions that can assess technologies in innovative SMEs are well established in Hungary. This report addresses an innovation assessment system that is based not only on the credit rating of innovative SMEs but also on their business potential and technology.

South Korea has established a goal of expanding technology financing through the development of innovation assessment systems. Implementing this process requires four policy tasks: (1) develop a technology information database characterized as public goods, (2) activate private technical credit bureaus (TCBs), (3) develop innovation assessment capabilities among financial institutions, and (4) promote the use of innovation assessment information.

In light of the experience in South Korea, an assessment system is as important as business content for policy financing for innovative SMEs. When the Hungarian government establishes an institution or system for evaluating the competitiveness and risks of innovative SMEs and start-ups, the government may need to consider the following suggestions. First, the assessment capacity and loan processing speed of the TCBs will be increased by hiring additional specialty personnel and TCB staff and by strengthening the collection of TCB assessment information. Second, evaluating banks in terms of their efforts in innovation financing is desirable. Third, each bank's loan performance for innovation should be released. Fourth, in order to implement the plan, the Hungarian government could establish task forces (TFs). Through the TFs, collaboration between ministries will be increased to develop an assessment model based on consumer (banks and other investors) viewpoints and to share innovation assessment information. Fifth, the consultation and advertising for innovation financing, including options relating to financial institutions and venture capital, should be considered.

We should be cautious when designing and activating this innovation financing ecosystem based on innovation credit assessments. First, enforced allocation of innovation financing should be avoided. Instead, designing and providing incentives for banks to finance innovative firms is desirable. Second, loan approvals will ultimately be determined at the bank's discretion, based on the assessment. The main purpose of innovation assessments is to increase the accuracy of the default rates when a bank decides to provide loans. Third, in addition to creating an innovation assessment system, policies that promote financing for innovations should be considered. For instance, an excessive innovation assessment service fee should be avoided to relieve the burden of assessment service fees on banks. Fourth, the effect of TCB-related policies should be evaluated, and concerns and potential issues that may occur in the future should be raised.

The default risk can be alleviated if enterprises are assessed based not only on credit but also on their innovation; this concept has been proven theoretically and empirically. The goal of the innovation assessment system is to increase the funding opportunities available to innovative start-ups and SMEs. This system will support the decision-making of banks, investors, and guarantee institutions. Ultimately, financial support for the real economy is expected to strengthen, and the soundness of financial institutions is expected to increase.

2. Public Employment and Vocational Training System for Effective Use of Human Resources

The main task of this part of the Hungary KSP is to figure out a direction for the reform of the Hungarian public employment and vocational training system for effective use of human resources by analyzing Korea's experience. This chapter starts with an analysis of the historical and institutional aspects of the Hungarian labor market structure. Specifically, the recent development of the Hungarian public employment service and skill-development system was analyzed along with the challenges faced by the Hungarian labor market today.

The radical economic and social changes in 1989–1990 resulted in essential changes in the labor market as well. As the Hungarian economy experienced a substantial decrease in production and a more intensive use of the labor force under new conditions, the population's economic activity decreased significantly and remained inactive for a long period. The 2008 global economic crisis hit the Hungarian economy and labor market, which had been growing since early 2000, and the Hungarian gross domestic product (GDP) and employment rate started to decline.

Although the Hungarian government recently implemented various labor

market measures to improve labor market conditions, many challenges remain in implementing additional labor market reforms. Low employability, a high youth unemployment rate, and a significant gender gap in employment are the most serious challenges. The lack of sustainable funding for labor market programs such as a public employment service and skill-development programs is also one of the major difficulties.

The Korean public employment service and vocational training programs along with the other labor market measures were reorganized and expanded to deal with imminent massive unemployment during the 1997 Asian financial crisis. The prompt and extensive response by the Korean government was possible due to the timely setup of the Employment Insurance System (EIS) in 1995. With EIS funding, the Korean government not only provides unemployment benefits but also expands public employment service, public work programs, and other job training programs to help the unemployed find new jobs. Unlike unemployment insurance systems in many developed and developing countries, the Korean EIS, which included the employment stabilization program, the vocational competency development program, and the unemployment benefits program, was implemented as a comprehensive system.

To implement a reform to revitalize the labor market, which can eventually lead to a higher employment rate for youth, women, and other vulnerable groups, the Hungarian government should set up a sustainable funding system. Korea's experience during the financial crisis showed that a reliable funding system could make a huge difference in carrying out labor market policies in a timely manner.

To improve the employability of vulnerable groups, the Korean government launched two programs that offer comprehensive services by combining vocational training and welfare programs: the Successful Employment Package Program and the Hope Ribbon Project. These two programs improved the employment rates of vulnerable groups. The programs have significant implications for the Hungarian government's labor market reforms since vulnerable groups in Hungary also suffer from low employment and a lack of skills. Many advanced countries including Korea offer comprehensive and user-friendly public employment service and skill-development programs that are linked to the welfare system. As we saw in Korea, the one-stop-service system for employment and vocational training has expanded to include nontraditional welfare services such as credit recovery counseling as well as welfare counseling services. It is also crucial that the public employment and vocational training programs provide services for employers. Similar to most developed countries, the Korean government provides subsidies and an information service for employers through the public employment service and job training service system.

Aided by the recent developments in information technology, many countries have been trying to make their public employment service and vocational training service user friendly by setting up online service systems. Korea's Work-Net and HRD-Net are good examples for the Hungarian government. With these online service systems, people can access the service easily and quickly.

In addition, individually focused comprehensive services including public employment, vocational training, and welfare can be more effectively delivered through an online-based system because all relevant individual data can be compiled without substantial effort and cost. Among the various services available through an online system, the most common are personalized information on online job applications, human resources management, and recruitment support services such as applicant selection services and recommendation services for suitable vocational training programs. In Korea, the intranet- and Internet-based services not only help find recruiters but also perform various services for youth work-experience aids and social service jobs. There are also group-counseling services such as achievement programs, youth vocational-guidance programs, and job-seeking programs.

It is also important to maintain a well-organized partnership among the related parties. Appropriate outsourcing of public employment service and vocational training services through the private sector can increase the effectiveness of public services.

Any labor market reform in public employment service and skill-development programs cannot be successful if the government (or markets, if applicable) ignores the following areas: (1) systematically assessing and monitoring the existing labor market program to evaluate its effectiveness,(2) consistently collecting and releasing data and information on labor market trends and forecasts to reduce mismatch in the labor market, and (3) maintaining closer links to the policies of different government organizations and agencies that are connected.

3. New Growth-Driven Industry Policy and Ecofriendly Automotive Industry Policy under Global Megatrends

Examining global megatrends that are fast approaching begins with a review of the megatrends in the automotive industry that respond to global megatrends. This report compares the new growth-driven industry policy and the ecofriendly automotive industry policy between Hungary and Korea and provides several policy recommendations.

In the future, the population will increase mainly in developing nations, with a shift in economic power toward Asia, rapid growth in technological improvements, and climate change. Consequently, in the future, the automotive industry will transition from developed-nation–specific consumption and developing-nation–specific production patterns to mainly production and consumption by developing nations. Furthermore, the trends in population growth and aging will lead to the use of small smart automobiles. More important, the constraints of fossil fuels and climate change will result in a rapid transition in the automotive industry from traditional fossil-fuel-based automobiles to ecofriendly automobiles such as electric and hydrogen vehicles.

Based on these global megatrends in the automobile sector, the Hungarian government plans to promote ecofriendly automotive industries as a new growth-driven industry. Through comparative studies of new growth-driven policies and ecofriendly automotive policies in Hungary and Korea, the report provides several policy suggestions.

First, the two countries face different economic environments in implementing new growth-driven industry policies. One main cause of the rapid economic growth in Korea was the government-led export promotion policies combined with very strong domestic protection until the 1980s. However, it is difficult for Hungary to adopt government-led industrial policies as Korea did. Korea used industrial policies when the country was less exposed to international pressure. Thus, Korea used independent export-expansion policies and promoted import-restricting policies to protect domestic corporations and markets.

In Hungary's case, however, EU membership prevents the country from using similar independent industrial policies. It is difficult for Hungary to implement government-led strategic industrial policies. As an EU member, Hungary must follow the EU's policy direction. Therefore, various industrial policies that contributed to Korea's economic growth cannot be applied to Hungary. The policy suggestions should be applied to Hungary with caution.

Second, the link effects in the automotive industries should be maximized by combining policies used in the automotive and parts industries. In Hungary's automotive industry sectors, four multinational companies have domestic SMEs. Therefore, more SMEs that are global must be attracted to provide components to the multinationals located in Hungary and export them to international partners. Policies should be implemented that promote international competitiveness of domestic component companies and increase component exports.

Third, policy strategies that combine the German model with the East Asian

model should be established for Hungary's development process. Hungary is in a distinct environment in which the country cannot use infant industry protection policies as Korea did. The strategic partnership programs that started in 2012 might be expanded.

Fourth, policies for developing high-quality human resources should be implemented. Because of the lack of sufficient financial resources, it is difficult to promote high-quality human resources via direct government investment. Collaboration is suggested between universities and automotive companies, including national research institutes such as KIST and the automotive contract department between academia and automotive companies.

Fifth, additional aggressive investment in ecofriendly automobile production is necessary. However, initiating production of automobiles directly is not recommended, except that the production of buses Hungary has already begun.

Finally, ecofriendly automobile consumption promotion policies should be implemented more extensively. The strategies in the E-mobility plan include a dissemination promotion plan that does not have significant financial support. The plan's tax incentives might not be enough to cover the price difference between fossil-fuel cars and ecofriendly cars.

2014/15 Knowledge Sharing Program with Hungary:
Strategy for Crisis Management and Economic
Development Policy for the Future Central European
Knowledge-based Hub Ⅱ

Chapter 1

Establishing a Rating Institution for Evaluating the Competitiveness and Risks of Enterprises

Establishing a Rating Institution for Evaluating the Competitiveness and Risks of Enterprises

Wook Sohn (KDI School of Public Policy and Management)
Balazs Laki (Ministry of Foreign Affairs and Trade, Hungary)

Summary

Hungary has made progress in catching up with the high-income Organization for Economic Cooperation and Development (OECD) member countries in many aspects. However, there is still room for improvement in the level of innovation activities and performance. In order to strengthen Hungary's research and development (R&D) capabilities, it is necessary to analyze the entire innovation system thoroughly, including innovation assessment and the financial support system for innovative firms.

Accessibility to financing resources is a problem for Hungarian small and medium-sized enterprises (SMEs). A significant proportion of these enterprises are not able to obtain sufficient external financing for their operations because of poor credit history and their young age. Although stimulation programs from the Hungarian government and the central bank of Hungary may be somewhat beneficial for established enterprises, they appear to have no significant effect on newly created enterprises. Programs supported by the EU are also attempting to assist SMEs, but they are designed to support mid-size businesses with small credit risk and are not suitable for start-up SMEs with innovative technologies.

Limited funds can be distributed efficiently only when beneficiary enterprises are assessed correctly. Thus, when policy-financing systems are developed, assessment systems for enterprises and technologies should be discussed simultaneously.

Currently, Hungary has no well-established models or institutions that can assess technologies in innovative SMEs. This report addresses an innovation assessment system that is based not only on the credit rating of innovative SMEs but also on business potential and technology.

South Korea has established a goal of expanding technology finance through the development of innovation assessment systems. Implementing this process will require four policy tasks: (1) developing a technology information database characterized by public goods, (2) activating private technical credit bureaus (TCBs), (3) increasing innovation assessment capabilities among financial institutions, and (4) promoting the use of innovation assessment information.

In light of the experiences in South Korea, having assessment systems is as important as business content with regard to policy financing for innovative SMEs. When the Hungarian government establishes an institution or system for evaluating the competitiveness and risks of innovative SMEs and start-ups, it may need to consider the following suggestions. First, the assessment capacity and loan processing speed of TCBs will be increased by hiring additional specialty personnel and TCB staff and by strengthening TCB assessment information collection. Second, evaluating banks in terms of their efforts in innovation financing is desirable. Third, the innovation loan performance of each bank should be released. Fourth, in order to implement the plan, the Hungarian government could establish task forces (TFs). Through the TFs, collaboration between ministries will be strengthened in order to develop an assessment model from consumer (banks and other investors) viewpoints and to share innovation assessment information. Fifth, it is worthwhile to consider the consultation and advertising of innovation financing, including options related to both financial institutions and venture capital.

We should be cautious when designing and activating this ecosystem of innovation financing based on innovation credit assessments. First, the enforced allocation of innovation financing should be avoided. Rather, designing and providing incentives for banks with high performance in innovation assessment is desirable. Second, loan approvals will ultimately be determined at the bank's own discretion, according to innovation assessment outcomes. The main purpose of innovation assessments is to increase the accuracy of default rates when a bank makes a decision to provide loans. Third, in addition to improving the innovation assessment system, policies that support the promotion of innovation financing should be considered. For instance, an excessive innovation assessment service fee should be avoided to relieve the burden of assessment service fees on banks. Fourth, it is also important to evaluate the effect of TCB-related policies comprehensively and raise concerns and potential issues that may occur in the future.

The default risk can be alleviated if enterprises are assessed based not only on credit but also on their innovation; this concept has been proven theoretically and empirically. The goal of the innovation assessment system is to increase the funding opportunities available to innovative start-ups and SMEs. The innovation assessment system will support the decision-making of banks, investors, and guarantee institutions. Ultimately, financial support for the real economy is expected to strengthen, and the soundness of financial institutions is expected to be enhanced.

1. Introduction

Hungary has made progress in catching up with the high-income member countries of the Organization for Economic Cooperation and Development (OECD) in many aspects and is equipped with good-quality human capital and a high degree of openness in the economy. However, there is still room for improvement in the level of innovation activities and performance. In order to strengthen Hungary's research and development (R&D) capabilities, it is necessary to analyze the entire innovation system thoroughly, including the innovation assessment and financial support system for innovative firms. Thus, it is essential to promote innovative and competitive corporations, particularly small and medium venture enterprises that serve one of the axes in the national innovation system, increase research and development as well as innovation capabilities, and harness the ability to produce economic value.

One of topics of the 2013 Knowledge Sharing Program (KSP) between Hungary and Korea was “strengthening Hungary's R&D capability.” Baek (2014) argued that the government should implement diverse and extensive business policies in the early stage of venture business development. Baek introduced some Korean cases of the provision of financial resources to start-up ventures and angel investment, in addition to assistance from policy funds. These included the Korea Funds of Funds, the Angel Matching Fund, the Korea Securities Dealers Automated Quotations Market as a trading board of the Korea Exchange, the small and medium-sized enterprises (SMEs) One-stop Clinic Service, the Youth Entrepreneur Training Program, and the Management of Technology program.

This chapter is a follow-up study of the 2013 KSP evaluating the knowledge-generating and transferring activities in Hungary that constitute the potential capability to bear start-ups and innovative SMEs. The Hungarian government has recognized the importance of R&D and innovative activities in SMEs for economic growth and aims to focus on policy to promote SMEs. In this regard, this topic has been proposed to investigate measures that promote small and medium venture enterprises and venture ecosystems based on the recent Korean experience.

Few start-up and SME funding programs are currently available in Hungary, and it is difficult for start-up enterprises with low credit worthiness to access the credit market. Thus, the business environment is poor for innovative enterprises in Hungary. Although stimulation programs from the Hungarian government or the central bank of Hungary may be somewhat beneficial for established enterprises, they appear to have no significant effect on newly created enterprises. Programs supported by the EU are seeking to assist SMEs as well, but they are designed to assist mid-size businesses with small credit risk, which are not specialized for start-up SMEs with innovative technologies.

Accessibility to financing resources is a significant problem for Hungarian SMEs. Numerous enterprises that are present in the market have proper business plans, conduct activities in accordance with market demand and expectations, and have satisfactory demand for their products. However, a significant proportion of these enterprises are not able to obtain enough external financing for their operations, mainly because of two issues.

One issue is the enterprise's young age. In the absence of a long and well-established history, investors may find it difficult to judge such an enterprise's creditability, and, therefore, they reject its requests even if it has appropriate cash-flow-producing ability. Another issue—not independent of the first one—is not having sufficient funds to obtain a bank loan. Often, mainly owing to its young age, an enterprise can boast favorable financial reports and positive achievements. Based on its credit history, it satisfies the bank's credit conditions. However, it remains unable to obtain credit because of the lack of acceptable tangible coverage. Banks strongly emphasize coverage because of the undeniable fact that the financial indicators of domestic SMEs, especially the smallest ones, are unreliable due to widely practiced tax avoidance, which, in fact, is widely accepted by the local society.

Planesa *et al*. (2001) claimed that the level of innovation could vary depending on the enterprise and industry size, proposing that innovative enterprises have more investments in intangible assets than other enterprises, and the level of innovation has no significant correlation with income, profitability, or failure rate. In particular, he stressed that since enterprises' innovative activities are limited by the constraint of financing, it is necessary for those enterprises to access funds conveniently through policies and measures, emphasizing, in particular, the importance of bank credit. World Bank and infoDev (2013) described the early stage of innovation financing in detail and proposed the use of growth strategies, investment management, governance, and risk management measures for start-up enterprises.

Hungary showed interest in establishing institutes or innovation assessment systems such as Korea Technology Finance Corporation (KIBO) to strengthen fund supply functions for start-ups and SMEs that lack funding based on an assessment of technologies, competitiveness, and future business potential. Currently, Hungary has no well-established models or institutions that can assess technologies in innovative SMEs, which is why Hungary is seeking information through case studies in Korea and creating detailed action plans.

In light of Korea's experiences, having assessment systems to search and select beneficiary enterprises is as important as the business content with regard to policy financing for SMEs. Limited funds can be efficiently distributed only when beneficiary enterprises are assessed correctly to achieve the goal of the financial policy and alleviate the risk of fund loss when the majority of policy financing is provided via loans. Thus, when policy-financing systems are developed, assessment systems for enterprises and technologies should be discussed simultaneously while these assessment systems continue improvements and advancements to keep pace with economic and technical environments.

This report concentrates on the functions and roles of innovation assessment institutions. In particular, we address the efforts to develop an innovation assessment system that is based not only on the credit rating of innovative SMEs but also on business potential and technology, as this is a main goal of the current government in South Korea. Through this report, we expect to derive implications for innovative small and medium venture enterprise assistance policies in Hungary.

This paper does not discuss overall SME-related policies in Korea or suggest policies for SMEs in Hungary based on Korea's experience. Instead, this paper focuses on the development of assessment systems for the financial support of innovative SMEs and start-up enterprises.

Many policies supporting SMEs in Korea are well summarized in the modular report, which is another format of the KSP that is available for reference. Lee *et al*. (2011) discussed the history of the establishment and roles of SMEs in Korea as well as the establishment of the Korea Credit Guarantee Fund, which sought to promote loans for SMEs. Lee (2012) explained the history and operation of policy financing and loan systems for SMEs along with the establishment and development of small business corporations. In addition, Park (2013) explained why large conglomerate-oriented promotion policies changed to SME-oriented policies pertaining to industry policies and structural changes in Korea and described structural changes in SME manufacturing and technology expansion policies. Kim and Kim (2013) reported promotional policies and start-up support programs for venture enterprises in Korea.

In addition, this paper does not discuss policy measures for overall innovation creation. This similar topic was dealt with in "Strengthening R&D Capabilities by Fostering Innovative SMEs," one of the topics of the 2013 KSP with Hungary. This paper, instead, discusses the need to develop a technological evaluation system and the specific measures required as follow-up tasks. In Korea, technological evaluation systems and financial markets for innovation have room for improvement, and the role of private finance in supporting innovative and entrepreneurial companies leaves much to be desired. In fact, except for some advanced countries, such as the United States and Germany, there are no countries where so-called "innovative" technology financing is generated smoothly through a combination of angel investment, private venture investment, technological transactions, or mergers and acquisitions. What is more important for innovative technologies to develop into growth engines is the induction of source technology development to guarantee success and pushing ahead with policies to expand the market. Corresponding to this reality, the key to a technology evaluation system is aggressive financial support through identification of businesses with highly innovative ideas and the potential to execute them.

In Sec.2, financial support for SMEs in Hungary is reviewed, and the current funding status for countries and the EU is discussed. In Sec. 3, assistance systems for innovative SMEs in Korea based on technology competitiveness are briefly explained and technology-financing ecosystems based on innovation assessment systems that are driven by the Korean government are introduced. In Sec. 4, policy recommendations regarding the development direction of innovation assessment systems for excellent technology-held start-ups and SMEs in Hungary are proposed based on experiences in Korea. The conclusion of this report is presented in Sec. 5.

2. Financing Innovative Start-Ups and SMEs and Rating Innovation in Hungary

After the 2007–2008 financial crises, external financing for SMEs became even more difficult to obtain than before. Stricter bank credit policies have greatly contributed to the fact that investment activity reached a historic low in 2012. In the summer of 2012, an interest rate reduction cycle started. This substantially reduced credit costs, and, therefore, the entire corporate sector's cash-flow positions improved, resulting in increased investment rates of return. However, the general credit cost reduction could not ease certain problems faced by the SME sector, such as exposure to foreign open exchange rate positions, debt burden from former loans, and accessibility to long maturity loans as stated by Berger and Udell (1998).

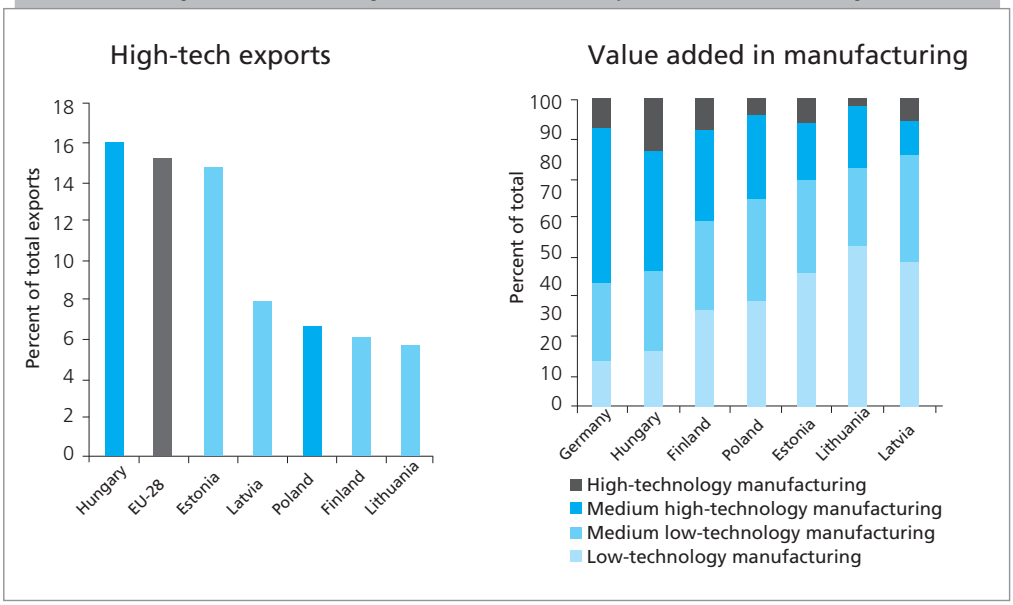
Investors often place their money in venture capital funds and immobilize their

savings for a long term. They, therefore, entrust the management of their capital to investment experts, whose expertise is debatable. These experts hardly take any risks and contribute only a tiny—if any—proportion of their own savings to an investment. By using the fund's money, they buy shares in different companies, which, in turn, are run by managers with limited leadership abilities and whose future behavior is highly unpredictable. Therefore, insecurity can be eased only partially even with the best incentives and controlling schemes. Venture capitalists and investors can never obtain as much information on companies as those involved in the internal company operations, that is, those who take part in the daily operations and operations management [Figure 1-1]. As a result, the owner's decision is not often backed by appropriate information. Furthermore, investors may end up investing in companies that, during the course of their operations, never realize any revenues and that, at the time of investment, lack existing products and services. In other cases, respectable companies may turn out to have failed, and invested capital can never be reclaimed (Bank for International Settlement, 2013). In this study, therefore, we construct a model to describe the problems arising from the lack of market information. This model serves as proof of existing risks and attempts to identify these risks. Furthermore, it aims to serve as a gap analysis that is specifically provided under the Joint European Resources for Micro to Medium Enterprises(JEREMIE) program (market assessments for Article 44a FEIs) and is focused on the financial impacts, in particular, business sectors. (See Appendix 1 for this model's theoretical approach.)

Discovery of problems arising from lack of market information

On September 11, 2014, the European Commission and Hungary signed a Partnership Agreement (PA) for the 2014–2020 period. This PA is the basic planning document for 2014–2020 EU-financed developments. The PA is a framework agreement signed between the European Commission and the Hungarian government to cover the period from January 1, 2014 to December 31, 2020, and it introduces the economic and social goals that the country wishes to achieve (Figs. 1-2 and 1-3). It also specifies the procedural and institutional framework within which the funds released in 2014–2020 could actually serve comprehensive national goals, such as achieving economic growth derived from sustainable, high-added-value production and expanded employment (European Commission and European Investment Bank, 2013; European Commission, 2014).

[Figure1-1] Role of High-tech Production in Exports and Manufacturing

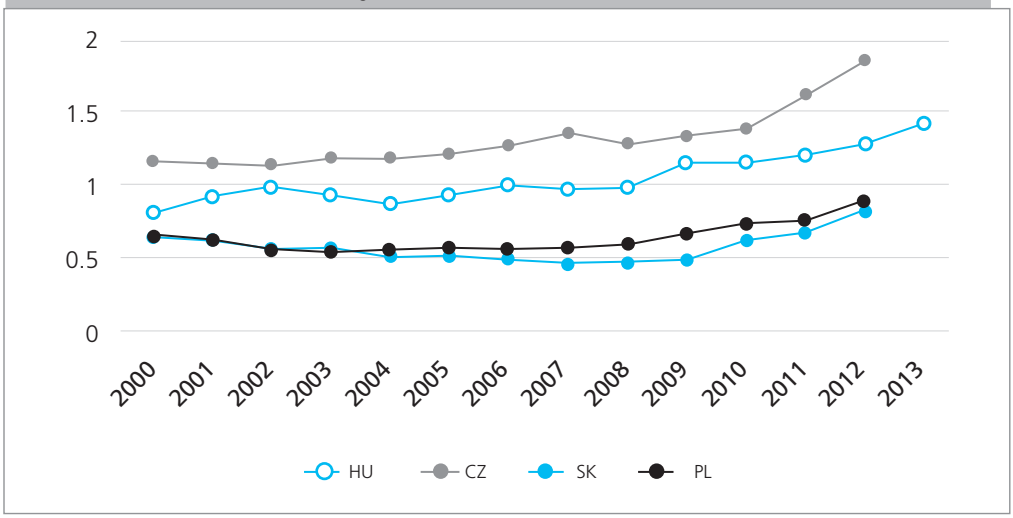


Source: Eurostat.

Unlike the development practices thus far, the emergence of refundable assistance schemes (grants) will definitely be novel compared to nonrefundable assistance schemes (financial products or instruments). The PA does not define exact numbers, though according to the content of submitted yet unapproved programs, a significant part of the resources (in the case of cohesive political resources, it may be as high as 10%) would reach beneficiaries as financial instruments.

Financial instruments boast several advantages besides their obvious one: they are less market distorting, as these assistance schemes—unlike nonrefundable assistance schemes—closely follow market mechanisms. They also have a larger development effect, and, therefore, public funds can mobilize additional private funds to achieve the above-mentioned goals. A major part of these assistance schemes is likely to be recyclable, and, therefore, they could serve as resources for domestic public development even after the program has ended. (Considering the latter strategy could prove to be crucial, depending on the outcome of the debate over EU cohesion politics.)

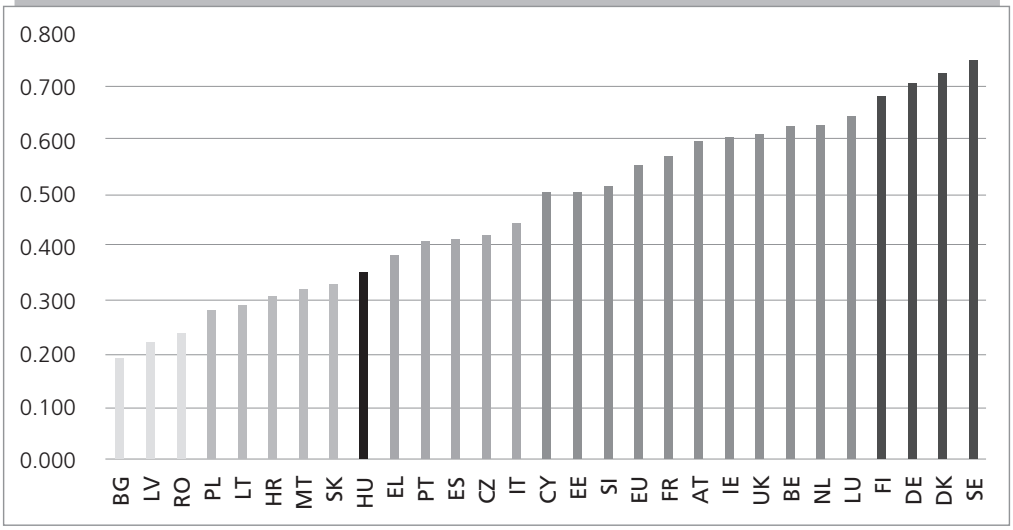
[Figure1-2] GERD in V4 Countries



Source: Eurostat.

Financial instruments are present in several themed development plans, especially in terms of improving SME competitiveness, R&D investment, information and communications technology (ICT) development, and energy (particularly for household and business-reusable and energy-efficient investments). Financial instruments could also serve as a part of social catch-up developments by providing microloans to the poor, as has already been proven to work in developing countries.

[Figure1-3] Innovation Index 2014



Source: Innovation Union Scoreboard 2014, EU DG RTD & EU DG GROW.

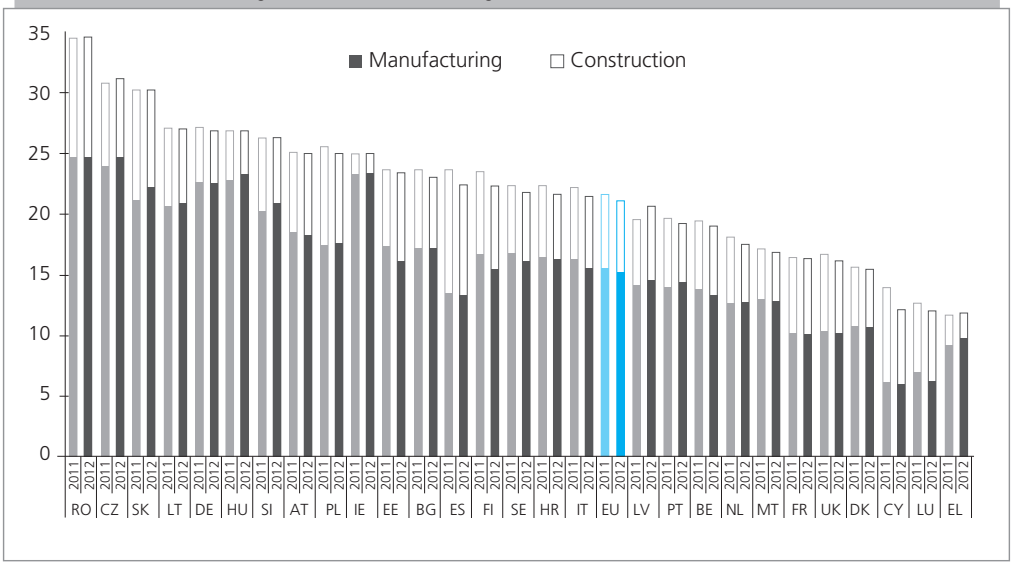
In the case of improving SME competitiveness, nonrefundable assistance schemes for businesses will presumably shrink, and, therefore, their application must be duly justified. A combination of financial instruments and nonrefundable assistance schemes will become a frequent form of financing.

The goal state that should be outlined in both national and regional terms envisages the strengthening of a sustainable knowledge and technology ecosystem that is long term and internationally competitive and serves our economic system, particularly in terms of industrial competitiveness. It is fundamental that in the operative programs concerned, the efficiency of source exploitation should considerably surpass what was the case formerly, thus, enabling changes in the industrial system that would first affect the corporate sector and second allow SMEs to be more active in RDI than their regional competitors are. As professional areas change continuously and are unpredictable in the long run, the success indicator of the governmental innovation policy is how the government can manage the adaptation of technology and markets to the fast-changing environment and what the correction and reaction ability of this innovation policy is like.

Specialization areas and directions derived from innovation system structure

It is noteworthy in the industrial section that, even on the EU scale, the processing industry market share is outstanding.

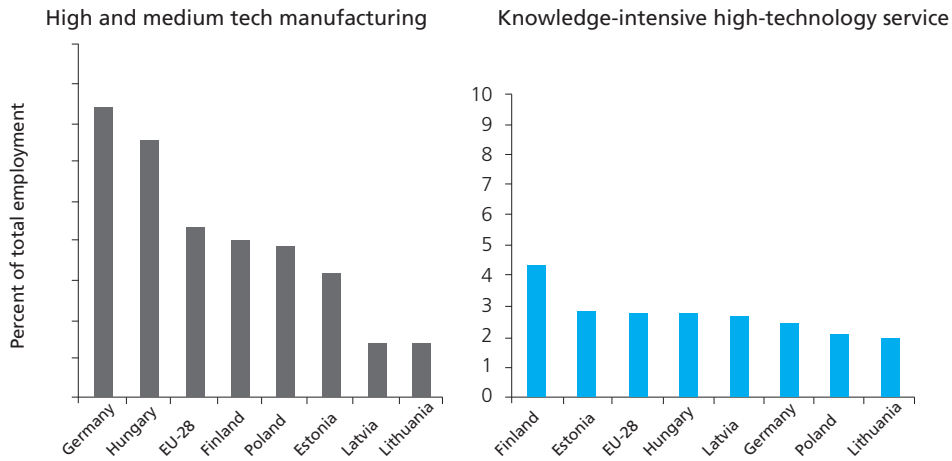
[Figure1-4] Manufacturing and Construction 2011–2012



Source: DG GROW & Eurostat.

Sectors such as road vehicle production, electrical industry, pharmaceutical industry, and some areas of ICT are building on corporate achievements, playing a dominant role in processing industry value chains and are acting as a globally significant force for growth [Figure 1-4].

[Figure1-5] Employment in High-Tech Manufacturing 2014



Source: EBRD.

Certain high-tech areas within these sectors, especially pharmaceutical development, medical tool production, and certain aspects of ICT, have produced a constantly developing and strengthening technology ecosystem that is worthy of global attention. Hungary boasts numerous excellent high-tech corporations that provide concentrated R&D results, and the strengthening of their position in the global value chain is strongly dependent on their R&D activity. R&D FDI plays a key role in the domestic innovation system. (The ratio to the BERD indicator is one of the highest in the EU, as in Ireland.) With respect of the R&D FDI location, tough competition with certain developing countries outside the EU is becoming increasingly typical. Concentrating on activities and specialized areas that are the most effective and conducive to the development of our industrial-innovation system should best serve to strengthen the position already achieved in investment incentives. It is also important to note that there is a significant difference that can be observed among processing industry development factors among countries that belong to different stages of development within the EU. Among other economies in the region, in terms of general advancement and balanced industrial structure, Hungary performs at the lowest level of catching up. Regarding other quantitative indicators (e.g., textile export and investment), countries from the same region

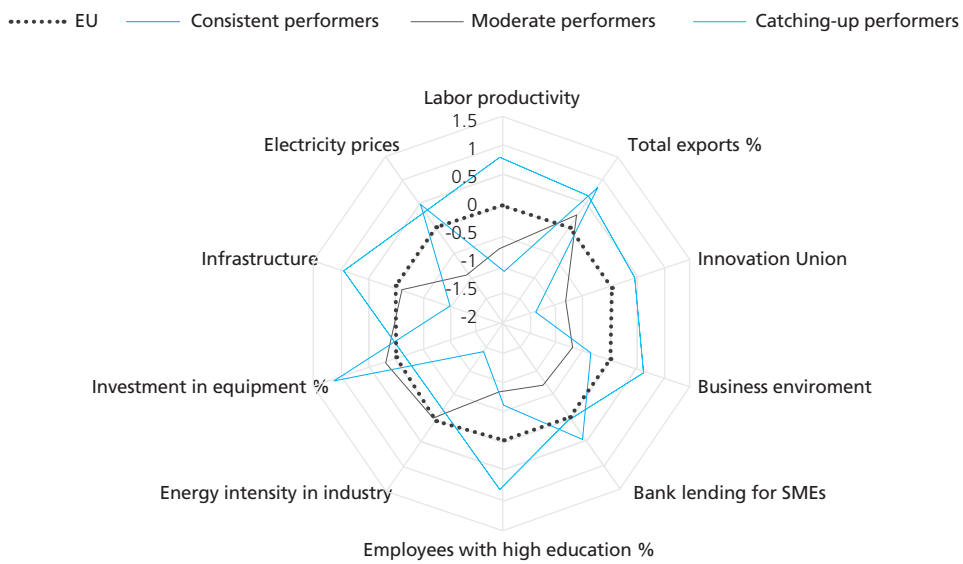
as Hungary boast higher indicators, in certain cases even outperforming member countries at a consistent level [Figure 1-5]. However, with regard to quality factors, especially productivity and innovation, the lag of countries that have recently joined the EU is still significant in the case of infrastructure and business environment as well. RDI activity represents only a slowly growing proportion in the strengthening of in-house research or RDI services in the entire domestic SME sector.

Therefore, the usually weak corporate performance (e.g., export growth and internationalization) of the SME sector provides little to no incentive for the development of domestic knowledge bases, as shown in [Figure 1-6].

The key to improving competitiveness within the region is quality factors, which first means strengthening the corporate innovation performance. Therefore, ranking these industrial activities should be based on such industrial and service potentials for which quality and innovative approaches are dominant.

EU co-financing capital programs (JEREMIE) that have a positive impact on the business environment for start-ups represent significant potential in Hungary for realizing a knowledge and high-tech ecosystem [Figure 1-7]. A start-up ecosystem has emerged in recent years, especially in the areas of IT, Internet, and certain software development and mobile technology platforms. Moreover, this dynamic entrepreneurial potential, which has high growth potential, is catalyzing a closer link between knowledge bases and the high-tech sector that can be exploited with innovation management development programs that build on intensified investor interests and willful venture sharing. The application of capital financing opportunities needs extra attention from the innovation sector as well as from the viewpoint of FDI, restructuring, and turnaround areas.

[Figure1-6] Performance Index 2013

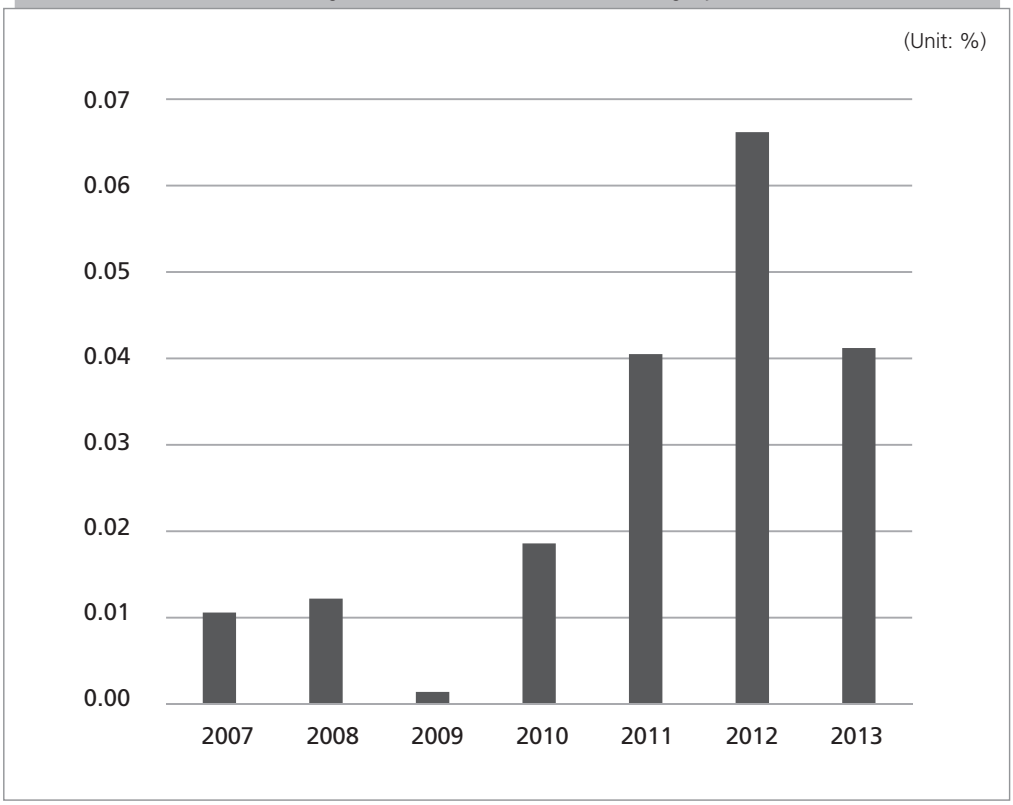


- Consistent performers: AT, BE, DE, DK, ES, FI, FR, IE, LU, NL, SE, UK
- Moderate performers: CY, EL, IT, MT, PT, SI
- Catch-up group: BG, CZ, EE, HR, HU, LT, LV, PL, RO, SK

Source: DG GROW.

The cornerstone of industrial innovation is for the SME sector, which plays a most important role in employment, to be integrated with a strengthened position in the building of a technology (not necessarily high-tech) ecosystem. One approach could be the successful execution of a start-up ecosystem-building program. Another approach could be opportunities such as opening global or macroregional provider system relations, innovation processes, or food industry chains. This is why developing industrial public properties in the Hungarian innovation system is considered important; this includes industrial parks, integrated establishment systems supported by regional cluster organizations, science parks, industrial research institutional networks, open labs, and university-based industrial campus developments, as well as the establishment of techniques that improve adaptive innovation demand [Figure 1-3].

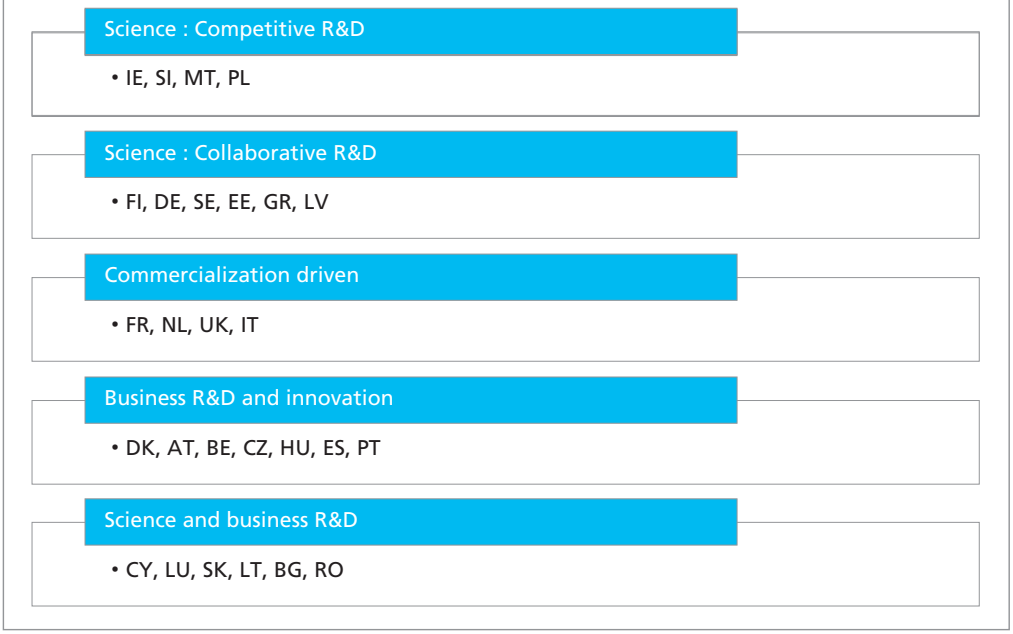
[Figure1-7] VC/GDP Ratio within Hungary



Increasing importance is being given to program-based research and innovation policies channeled through concrete "policy measures" (on which the present analysis is based) relative to institutional funding (i.e., budget for the functioning of public organizations, mostly comprising salary and administrative costs). This shift can also be observed in the number of policy measures that grew steadily until 2009. DG GROW, upon closely examining the differences between policy mixes in countries, revealed five different profiles (European Commission, 2014). These are applied by countries that belong to different performance groups according to the Innovation Union Scoreboard [Figure 1-8].

The JEREMIE program launched by the European Commission and the European Investment Bank encourages the application of financial instruments in the EU member states. These so-called JEREMIE products play a significant role in achieving EU support policy goals: They provide beneficiaries with flexibly applicable and sustainable financing that has a significant multiplier effect on both private and state investments (OECD, 2012).

[Figure1-8] Policy-Mix and Innovation Performance Groups within the EU



Note: Science-competitive R&D focused: Focus on competitive R&D programs with an increasing share of business innovation support measures and the use of R&D tax incentives. Science-collaboration focused: Focus on collaborative R&D, support for loan and venture capital funds, and no use of R&D tax incentives. Commercializationdriven: Focus on technology-transfer mechanisms, strong support for entrepreneurship, loans, and venture capital, and extensive use of R&D tax incentives. Business R&D and innovation: Focus on direct business R&D and business innovation and use of R&D tax incentives. Science and business R&D: Focus on competitive R&D programs and no use of R&D tax incentives.

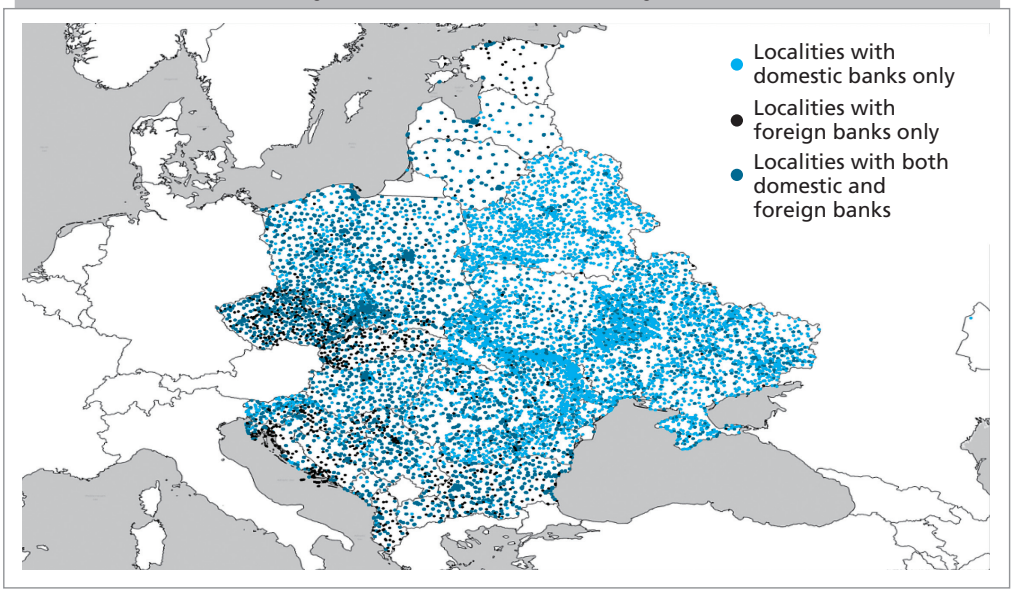
During the 2007–2013 EU budget cycle, member states could deliver a part of their financial support from the structural funds with these instruments. Hungary played a pioneering role in the promotion and expansion of program and, by the end of the cycle, launched the most widely spread financial instrument program in the EU via the Economic Development Operative Program's (GOP). At the time of planning, 23.9% of available GOP resources were allocated in JEREMIE products.

The intentions of the Commission are clear. In the long run, financial instruments will hopefully gain more ground than nonrefundable supporting schemes and let member states place more resources in a wider scale of such instruments. In the position paper sent to Hungary, the Commission encouraged Hungary to build on the success achieved in the past cycle and expressed their hope that Hungary would apply such instruments even more widely (OECD, 2013).Among the points emphasized, a detailed analysis supplemented by a gap analysis on the achievements of the 2007–2003 periods could significantly contribute to a more effective and purpose-driven application of financial instruments in the 2014–2020

period. Therefore, this study evaluates the JEREMIE program in Hungary from 2007 to 2013.

The Hungarian JEREMIE program basically established three types of products—credit, guarantees, and venture capital—supplemented by two combined products—credit and nonrefundable financial support and a combination of guarantees and nonrefundable financial support.

[Figure1-9] Variation in CEE Banking Market



Source: EBRD.

Credit products

The first JEREMIE transactions were conducted at the beginning of the cycle in January 2008 within the framework of the microloan scheme. The rules of accessibility for this credit product changed several times during the program, and a significant boom in contracts was experienced when the so-called New Széchenyi Credit product was established following minor corrections. This is mainly due to two factors:

- they raised the credit limit for financial enterprises,
- and in the case of all credit intermediaries, they uniformly raised refinancing to 100% (subsequently, this reduced to 75% for credit institutions).

The economic structure that was formed following the change in the political system during the 1990s is characterized by a duality: businesses can be divided into a small number of export-oriented corporations and numerous SMEs that are rather involved in the local economic life. Owing to the situation of the SMEs, their performance may significantly affect domestic economic situations. Despite these facts, there is a notable variation in the CEE banking market [Figure 1-9].

Because of the crisis, starting from the end of 2008, the dynamic growth of credit to domestic businesses stopped. Between September 2008 and December 2013, the domestic bank credit volume for businesses dropped by 18.4% from HUF8.553 billion to HUF 6.979 billion. Upon filtering the effects of exchange rates, based on our own calculations, the decline was close to 24%. In the second half of 2013, as result of the National Credit Program, the working credit volume for SMEs grew significantly.

Corporate financing

The role of Hungarian credit institutions was taken over partially by foreign financial contributors, partially by the corporations themselves, or by bond market investors in the case of large corporations. The corporate loan volume from abroad or commercial loans not coming from banks as well as bond financing has grown significantly (even though this is mostly due to a low base and a few large-scale transactions).

The role of banks was essentially taken over by foreign financial contributors in the case of corporations (e.g., parent companies): their proportion grew from 40% at pre-crisis to nearly 50% subsequently. This way of obtaining credit is characteristic of multinational corporations operating in Hungary, as it is usually the parent company, and not the local interest, that makes a financing-related decision. The proportion among commercial loans that companies provide each other within their liabilities (11%) can be considered significant at present. Bond financing is still not too representative (5%), and it is limited to a small number of businesses. Overall, the liabilities of Hungarian corporations did not decrease nominally because of the crisis (though the real value of stagnation is up to 20%), and the place of domestic bank loans was taken over by other forms of financing.

SME financing

With the emergence of a new economic structure following the political transition, SMEs have played a significant role. At present, SMEs have a significant influence on the performance of the Hungarian economy and are responsible for a major part of employment.

According to preliminary data from 2012, 58.3% of the sales turnover realized, which is a good indicator of a company's performance, can be attributed to SMEs. Between 2001 and 2009—except for two years—the market share of the SME sector was at least 60%; since 2010, this has decreased slightly to 58%–59%. Unlike the sales turnover, in terms of the gross added value, the SME market share has not decreased since the crisis. The proportion has remained ~55% since 2007, and according to preliminary data for 2012, it was 55.2%.

According to the preliminary data for 2012, of the 2.7 million people employed by companies, nearly 2 million worked for SMEs. Since 2002, 72%–74% of all people employed worked for the SME sector. In terms of the structure of the number of people employed, no major changes have been observed for ten years. Among all the people employed, 37%–39% work for microbusinesses, 17%–19% for small enterprises employing 17–49 people, and 16%–17% for medium enterprises. The employee per capita sales turnover grew, keeping with the size of the business. According to preliminary data for 2012, the employee per capita sales turnover for medium-size enterprises was HUF 36.2 million on average, whereas for small enterprises, it did not exceed HUF 28.1 million on average. The employee per capita revenue-generating capability of companies also increased with the facility size.

In 2010, of the total gross added value of all EU businesses, the SME sector accounted for 58%. In terms of the added value, Hungary is below the EU average; however, in terms of the number of employees, Hungary is above the EU average. According to preliminary data for 2012, of the 629,585 businesses operating in Hungary, 628,707 were SMEs, which indicates a relapse. Between 2002 and 2011, except for 2004 and 2005, the number of operating SMEs was between 680,000 and 700,000. According to 2010 data by Eurostat, 99.7% of businesses operating in the EU (EU-27) were SMEs. The ratio is above 99% in all member states.

The survival capacity of SMEs is low. In 2006, nearly 60,000 new SMEs started operations, but only 40.1% of them were in existence in 2011. In terms of survival, the ratio was the worst for companies employing 10–49 people, and only 39.6% of SMEs established in 2006 still operated in 2011. Microbusinesses make up 98.5% of SMEs, with a survival rate of 40.1%. Of the 75 SMEs established in 2006, only 36 were still operating in 2011. The survival capacities of SMEs are strongly affected by the characteristics of their activities.

Overall, after 2008, the credit market became significantly stricter, and this tendency has not yet resulted in greater outsourcing. The narrowing of SME financing is affected by elements of both the supply and the demand sides. Resource contraction from the supply side is attributed to the characteristic ownership structure of the banking sector, as in most banks, the parent bank restricted foreign

currency supplies formerly used for foreign-currency-based financial support for growth. Furthermore, owing to unfortunate tendencies in the international financial market, financing costs increased significantly. The disappearance of cheap liquidity as well as pressure from the capital market both resulted in a decrease in supply, and for the corporate segment, significant portfolio cleaning was required, resulting in decreased activity in certain segments. Demand was first characterized by the change in the requirement directions: alongside the change in the demand for investment credit, the demand for short-term financing increased, the volume of demand for the temporary financing of receivables increased, and internal sources of businesses decreased significantly. The change in the credit market volumes followed this tendency: the credit volume of the SME sector has stagnated since 2008, and the volume and value of payments has decreased.

Encouraging credit market activity in the current economic and banking environment would support cheap refinancing and guarantee that the product cross-influence is secondary, as the demand for investment credit has dropped significantly. The vitalization of the credit market by guarantee programs is not viable, as the existence of a guarantee in itself does not encourage lending if there is no proper demand in the market. Market participants agree with this statement: guarantee products can only fulfill their role if their goals are to provide bank credit; however, owing to certain factors, supplemental coverage is needed because of the higher risks involved in nonstandard transactions (lack of coverage, higher client risk). As leverage, guarantees do not encourage the financing of clients with improper risks.

Guarantee products

Nevertheless, guarantee products did not become successful products of the program; they contributed much less JEREMIE financing than expected. During the entire advancement, a low number of transactions and low intermediary activity was characteristic. Until the beginning of 2012, only 400 transactions had been completed, which was partially attributable to the low demand for investment credit that could be involved in the program and partially to established guarantee products accessible in parallel. The frame of the program shrunk several times, and it advanced slowly, partially owing to accountability doubts in the EU.

With the advancement of the program, an indemnity product was established linked to a combined credit guarantee process. Even though it did not deliver outstanding results, it was a very promising option. Through a single-window system, credit supported with guarantees and nonrefundable assistance schemes are both accessible. In addition to modifying the program structure, shortening the processing time, insurance of a proper scale for nonrefundable financial support,

and revoking interest margins are strongly recommended.

The framework for guarantee products is HUF 8.5 billion from GOP, from which HUF 4.2 billion (~50%) was immobilized by the end of 2013. From the central region, an additional HUF 3.5 billion was available; this sum was completely immobilized by the end of 2013.

We can draw the following conclusions from the current cycle of the New Széchenyi Program: except for 2013, there was only very little demand, and it basically depended on the decision of the credit institutions, what type of indemnity they used in the guarantee of Garantiqa Hitelgarancia Zrt., or whether they needed the guarantee of MV Zrt instead. This duality was abolished by IH in December 2013 when it ended the program.

The guarantee product was not particularly successful. Compared to the planned expectations(and the 20% collapse probability calculated in 2013), it immobilized few JEREMIE resources. During its entire advancement, a small number of transactions and low intermediary activity were characteristic—until the beginning of 2014, only 800 transactions had been conducted—partially owing to the low demand for investment credit in the program and partially because of the established guarantee products accessible in parallel.

Leasing and factoring

After 2008, the leasing market shrunk to one-third its previous size. Leasing in itself was developed to manage market dissatisfaction (limited capacity of bank asset valuation) for the purpose of financing enterprises that were viable but lacked bank coverage. Even though it did not belong to the supported financial instruments in general between 2007 and 2013, based on the current and expected market situation, certain leasing programs (closed- and open-ended leasing) are suitable for filling the existing market gap.

In the current economic situation, factoring can be used to improve corporate liquidity. It may be carried out by using other financial instruments, and if this approach is to be supported, it could play a role in advancing the Hungarian credit market. At the same time, new Civil Code regulations could improve the situation of those most in need of financial support, namely, micro- and small enterprises.

Venture capital

Capital funds supported by the JEREMIE initiative became a determining element of the domestic venture capital market. The EU support in all programs had to be

supplemented by 30% of external funds, which ensured a business approach to investments.

Venture capital plays a crucial role in the early stage of a SME when the enterprise cannot obtain traditional forms of financing (e.g., credit) despite outstanding potential for growth because it is not yet well established and it does not possess invested instruments that could help it obtain credit. It should be noted that venture capital is not a viable alternative for most SMEs because it is innovative and accessible for enterprises that have a huge potential for growth and who can ensure big revenue.

In 2007–2013, two products were available: the New Hungary Venture Capital (Új Magyarország Kockázati Tőke) and the New Széchenyi Venture Capital I (Új Széchenyi Kockázati Tőke I). GOP allocated a total of HUF 86 billion for this purpose, from which HUF 26 billion was spent by the end of 2013. From the HUF 4 billion framework of the central region, HUF 2.4 billion was immobilized by the end of 2013. By the end of 2015, together with the venture capital fund management's own share, financial support will enable HUF 131.4 billion of investment.

The main goal of the programs is to improve the capital situation of SMEs that are still in an early (seeding and launching) stage. Until 2010, the Hungarian credit market was underdeveloped, large-scale transactions were dominant, and only a few market participants dealt with capital financing of SMEs in their seeding and launching stages.

Within the framework of these programs, MV Zrt. (Venture Finance Hungary Private Limited Company) mediated resources to venture capital funds, thus, expanding options to raise capital for SMEs. The direct partners of MV Zrt. are venture capital management funds, and resources can reach businesses through their assistance. In addition to carrying out investment activity, it is the duty of these management funds to involve private capital in the resources obtained via MV Zrt.

Capital funds supported from JEREMIE-financed funds became a determining element of the domestic venture capital market. Even though the achievements from investments by funds that were announced in the first and second rounds (the second to a smaller extent) can be shown, they provided an outstanding quantity of financial resources for their target groups. For the coming years, accessible resources in the market ensure enough supply, and, thus, further outsourcing opportunities seem limited in the case of further selected funds (third and fourth rounds), because this obviously means oversupply. However, this does not necessarily mean that resources cannot be outsourced by the end of 2015; it is just likely that the quality of portfolios will be far from ideal because of "forced" transactions.

The main opposition between supply and demand is that businesses that can accept venture capital support are characteristically in big cities (in Hungary, this means only Budapest) and form near big cities/are sustained in big cities, while according to the regulation, central Hungary can manage a significantly lesser amount of resources. The main imperfection of the domestic venture capital market is the business environment (high tax burden, complexity of tax regulations, administrative burden, and underdeveloped innovation institution system) and infrastructure (especially human infrastructure, and lack of financial and corporate training in secondary and higher education).

SZTA (Széchenyi Venture Capital Investment) cannot compete with bank credit or other state investment agencies, as they do not require applicants to have coverage. In case of existing credit, the bank welcomes a professional co-owner, which is beneficial for the bank, too. Clients choose SZTA because the size of the transaction is in accordance with demand. They usually work with no IT, biotech, renewable energy, and multinational companies because their competitors work with such companies already; instead, they work with companies that compete in the rather traditional industrial segments such as the metallurgical industry.

Intermediary network

For the sake of program execution, an expanded external intermediary network was involved. JEREMIE products could not earn enough space in bank portfolios. This was partially because internal bank operations found it difficult to manage these products, partly due to administrative regulations that made alternatively accessible products more attractive. Financial enterprises were mostly established with the purpose of selling JEREMIE products, and following 2011, they served as the unequivocal motors of credit product expansion and played a significant role in the success of the combined microloan product. Once they reached the limits of the framework in central Hungary, they focused their activities on the countryside.

Local business development funds have dealt with microfinancing since the 1990s. Initially, they were the major sellers of credit products; later, the combined microloan products became a major element in their portfolio.

Thus far, two announcements have been made about choosing venture capital funds: in 2009, they chose eight growth funds, and in 2012, they launched eight growth funds and four seed funds. In 2013, an additional four growth funds were selected.

The general principles of improving the financing system for SMEs and start-ups are as follows. (1) In addition to this macro-approach study, it is important

to prepare the complete resource map and the strategic overview of credit and guarantee products supported from state and EU funds suggested and accessible during the 2014–2020 planning period. (2) In this regard, a structured definition of the financial support policy that these financial instruments are aiming for should be provided. Therefore, programs that play a strategic role and aim to support innovative and developing businesses in the first place should be detached and should be given special attention, along with programs that are mainly announced for absorption purposes. (3) A revision of the institutional monitoring system, which shows parallelism, is also suggested. (4) In terms of administration, reducing administrative burden is crucial (electronic procedures linked with integration, automation, positive discrimination of former successful applicants, etc.). (5) The problems that emerged during the last support period in close relation to JEREMIE products were related to financial instruments and enterprises participating in the program; they also emerged in intermediary institutes in terms of exclusive support, consulting, and education support. (6) Potential beneficiaries need calculable, single-window administration that is planned and timed publicly with the planning of resource allocation for continuously arriving applications. Financial services will probably take on the assistance of noncredit clients as well, as the cross-sales potential is huge, and they are also experienced in the process of closing contracts related to financial support, payment, and verification.

3. Innovation Assessment and Finance in Korea[1)]

Innovation or technology financing supplies funds for technology ideas, development, and commercialization based on valuations of the technologies or ideas that have the potential to generate future revenue. Innovation financing is largely divided into investment financing, loan financing, and policy funds, depending on the characteristics of the technology and the growth stage of the corporation. Investment financing is provided based on the expectation of future revenue from certain assets. Typically, this form of financing is provided by venture capital in the early stage of a corporation characterized by high risk and high return. Loan financing is supplied based on the capability to repay the loan principal and the financial information assessed by financial institutions. Banks normally provide this form of financing in the growth stage.

1) This section is based on two reports: one from the Korean Government (2014) and the other from the Financial Services Commission (2014).

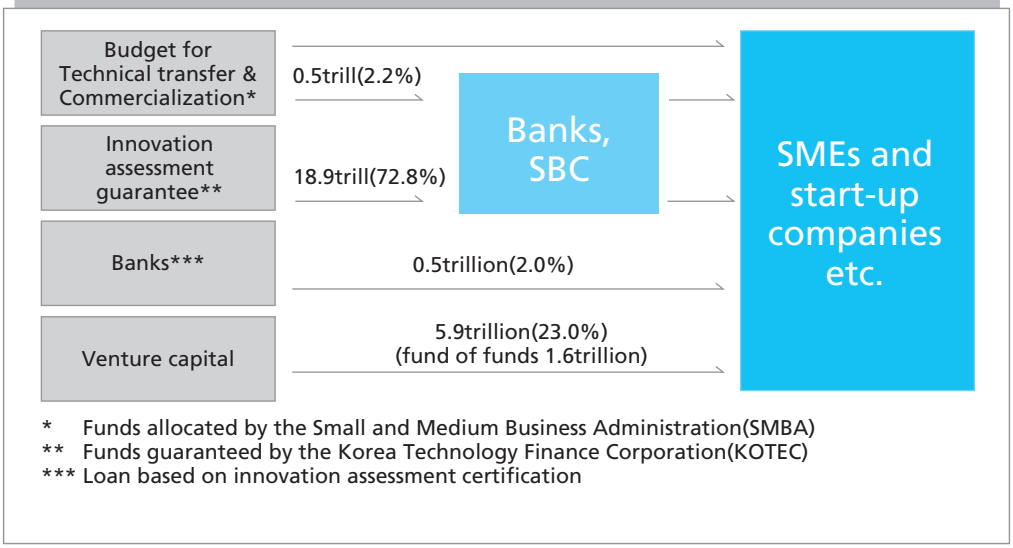
In Korea, innovation financing is mainly supplied in the form of loans, using the government-supported loan guarantee program. Banks provide innovative corporations with loans based on a technology credit guarantee, primarily by the Korea Technology Finance Corporation (KOTEC). Investment financing is relatively smaller than loan financing because of the significant risk aversion in Korea; however, there is a trend toward gradual expansion of venture investment. Policy funds provide assistance with technology transfer and the commercialization of innovative corporations.

As of the end of 2013, innovation financing was about KRW 26 trillion. Of this, loan financing based on KOTEC credit guarantees was KRW 19.4 trillion, which accounted for 73% of all innovation financing. Investment financing (KRW 5.9 trillion) was provided in the form of investment in equity shares of technology corporations by venture capital. Technology transfer and commercialization are supported by government-funded and public research institutions, which use funds allocated by the Small and Medium Business Administration, which was only KRW 0.5 trillion.[2)]

It is critical that innovation financing be based on a credible and accurate innovation or technology assessment system; this is a prerequisite for the expansion of innovation financing. An efficient assessment system will play an effective role in reducing the uncertainty and asymmetric information that is inherent in innovation financing. In addition, a highly credible innovation assessment system will decrease risks to financial institutions and enable the creation of venture investment.

2) Financing for all types of SMEs at the end of 2013 was KRW 488.9 trillion from loans, KRW 5.9 billion from investments, and KRW 0.8 billion from equity and bond issuance.

[Figure1-10] Innovation Financing in Korea as of the End of 2013



Source: Korean Government (2014).

3.1. Innovation Financing Issues

Despite the strong encouragement of innovation financing by financial institutions, appropriate infrastructure and incentive schemes have not been provided. The innovation assessment system is characterized by public goods, which require risk diversification and the creation of synergy through the collaboration of interested participants instead of individual financial institutions.

First, the banking sector did not develop an infrastructure sufficient for innovation assessment because of a lack of incentives and interest in innovation financing related to the loan supply. Although the Korea Development Bank (KDB) has an independent department that assesses technologies for loan examination, it is not actively used. Additionally, an independent innovation assessment model and innovation information database model have not yet been developed. Commercial banks aim to develop infrastructure, such as human resource expansion, to create loan demand for technology and innovation corporations, but this has not been actively pursued. Efforts to provide human resources are still in an early stage, and no systematic approach has been adopted because of a lack of experience and expertise.

The Korea Credit Guarantee Fund (KODIT) performs guarantee tasks based on credit assessment. However, the demand for innovation assessment has been increasing because of the expansion of technology-related trading corporations. KODIT has used external assessment information to examine guarantees in response

to the expansion of innovation assessment.[3)]

KOTEC performs innovation assessment tasks for guaranteeing technology by using specialized internal personnel and assessment models. It was established solely to provide guarantees based on innovation assessment; therefore, its fundamental task is innovation assessment. KOTEC has specialized personnel that assess the innovation-based merit of technology.[4)] KOTEC's internal personnel produce assessment results that are based on their internal models. In addition, it has developed a database (about 60,000 datasets) containing its trading corporations and guarantee-related assessment results.

Unfortunately, the current market for innovation assessment does not provide sufficient information for the assessment of innovation and the innovation financing requirements of financial institutions. Because it has focused on the early stage of R&D and technology development, its use is limited to innovation financing carried out by financial institutions. Assessment can be divided into the following categories according to policy purposes and specialized technology fields: (1) assessment of the objectives of innovation financing, (2) assessment of the objectives of R&D technology transfer, and (3) assessment of specific industry fields. KOTEC produces information for its own decision-making when deciding on technology guarantees, which is why it has limited accessibility, and its demands differ from the demands of financial institutions. There are no assessment markets or institutions that provide innovation assessments that are in line with the demands and purposes of financial institutions.

Another reason for the difficulty in forming an appropriate assessment market for innovation financing is the lack of interest in and the absence of use of innovation financing by financial institutions. Because most innovation financing is dependent on technology guarantees, the risk of which is borne by KOTEC, financial institutions are not enthusiastic about providing innovation financing. Furthermore, there is no motivation for financial institutions to expand innovation financing because of the large risk involved. Because of the high dependence on guarantees and collateral (nearly 80% of all SME loans), the number of specialized personnel in innovation financing is insufficient, and the systems for assessing innovation are inadequate (see <Table 1-1>).

3) Since January 2014, the SMART3 system of the Korea Invention Promotion Association has been used to assess knowledge assets.
4) About 530 staff members are employed in assessment, of which approximately 130 hold Ph.D.s and are qualified specialized personnel.

〈Table 1-1〉 Conditions of Loans to SMEs by Financial Institutions (as of end 2011)

Real estate collateral	Guarantee by guarantee institution	Savings deposit collateral	Personal guarantee	Bank guarantee	Pure credit
34.9%	32.3%	5.9%	6.9%	7.8%	21.4%

Source: Korea Federation of Small and Medium Business (2012).

3.2. Recent Efforts in Developing an Innovation Assessment System

Based on the determination that Korea lacks an innovation assessment ecosystem to address technology-financing issues, Korea has established a goal to expand technology finance through the development of innovation assessment systems. Implementing this process will require four policy tasks: developing a technology information database (DB) characterized by public goods, activating a private technical credit bureau, building innovation assessment capabilities among financial institutions, and promoting the use of the innovation assessment information. These four tasks are discussed in more detail below.[5)]

3.2.1. Development of a technology database

The most difficult task in innovation assessment is to find the information required and to retrieve the required foundational data. Patent and market information, which are essential in assessing innovation, are distributed by several sources, such as domestic and international research institutions, associations, working papers, and academic journals.[6)] In general, 70% of the total assessment time is required for the information search and the case analysis required for innovation assessments.

A system that heightens the accessibility of dispersed technical and trading information is a prerequisite for the activation of innovation assessment. If accessibility to innovation information is increased through the efficient

5) Shin (2014) also pointed out the issue of SME financing and the venture capital market in South Korea and recommended activating innovation financing to achieve the creative economy government goal.

6) For instance, the Korea Institute of Science and Technology Information holds about 100 million sources of science and technology papers, and the Korea Institute of Patent Information (KIPI) holds about 200 million sources of national and international patents and intellectual property information.

development of a technology database (TDB), it is likely to reduce the cost of assessment and the difficulty of the information searches performed by financial institutions. Innovation information, unlike financial information, changes rapidly, so up-to-date information is important. Therefore, high costs and many human resources are required to integrate and manage innovation information.

An innovation or technology database is a highly important public good, considering the effect of economies of scale on integration of information as well as the costs incurred in maintaining the database. If all financial institutions and technology assessment bureaus constructed innovation information DBs, much effort and cost would be incurred, including the inefficiency of duplicate information.[7] The function of the DB would be to reprocess and reclassify the information so that it is appropriate for financial institutions rather than a simple accumulation of innovation information.

An innovation information DB is a public good, which also creates the possibility of its use by a certain institution only; therefore, an efficient governance structure is important. Thus, the main principles of the technology DB would be as follows: (1) specialty and independence should be maintained to provide information that meets the demand for high responsiveness, and (2) the integration effect should be maximized by encouraging the sharing of technical and trading information between interested participants, thereby preventing the exclusive use of innovation information.

A technology DB is designed to meet these standards. It is necessary to develop a DB that is owned by consumers and producers of the innovation information to fulfill the characteristic of a public good. Therefore, a TDB should be established as a joint venture in which the consumers of innovation assessment information participate.[8]

A TDB accumulates innovation information, correct information, and market information, as well as assessment and trading information. It aims to have agreements to facilitate information sharing with institutions that produce innovation information, such as KIPI and various research institutes. Operational costs, such as personnel costs related to the TDB, are designed to be purveyed through the service fee charged for using the information in the DB.

7) For instance, personal and corporation credit information is managed via the Korea Federation of Banks (KFB) in order to take advantage of the characteristics of public goods and centralized management of the database.
8) Consumers include policy financial institutions such as the KDB, the Industrial Bank of Korea, KODIT, KOTEC, commercial banks, capital market infrastructure institutions, etc.

According to the above-mentioned Credit Information Act, the KFB, a credit information collection organization, can function as a TDB by intensively managing technology information.[9] About four million pieces of data, including information collected from 32 private and public organizations, were supplied to 23 institutions, including banks, guarantee institutions, and technical credit bureaus(TCBs). Up to the end of 2014, the number of information-providing organizations and data pieces increased to approximately 100 million and 10 million, respectively, and the institutions using the data will be expanded gradually.

3.2.2. Activation of technical credit bureaus

It is more economical to outsource innovation assessment tasks to external specialist institutions because of the complications and the institutions' expertise in innovation assessment. If financial institutions such as banks internalize innovation assessment tasks, they need a large number of technical experts, perhaps as many as KOTEC has. When outsourcing assessment tasks, financial institutions should understand the assessment outcome and reflect on the results in their decision-making.

To activate innovation financing, the role of TCBs has become important in reducing information gaps through collaboration with financial institutions. The participation of various private experts should be activated to provide useful information to financial institutions and increase the reliability of the assessments. In advanced countries, many private specialty TCBs are present in various areas, such as IT, bioengineering, chemistry, and nanotechnology, to meet the demands of financial institutions.

In order to encourage many institutions to participate in TCBs, the Korean government requires only minimum standards for the business of innovation assessment regarding personnel and physical requirements.[10] This business opportunity is open to (1) credit bureaus such as corporation credit bureaus or credit rating agencies, (2) accounting firms or patent offices that satisfy certain requirements, and (3) corporations that satisfy the legal requirements. Three companies—KOTEC, Korea Enterprise Data, and NICE Information Service—were designated to operate as TCBs in 2014. In addition, a regulation to prevent conflict of interest was introduced to ensure the independence and reliability of the innovation assessment.

9) The Korean government also assigned the KFB when it developed an individual and corporation credit bureau before this TDB.
10) The personnel requirement includes technical and financial experts, and the physical requirement includes an innovation assessment model and computer facilities.

The weighted sum of the innovation grade and credit rating produces an innovation credit rating (the grade system is the same between the innovation credit rating and the credit rating). For instance, a firm with a credit rating of only a B may not be able to get a bank loan. However, if an innovation grade of T2 (the second best) is added, the overall innovation credit rating can be upgraded to an A, which allows the innovative firm to be funded by a bank.

3.2.3. Building up the capabilities of financial institutions in innovation assessment

It is critical for financial institutions, as consumers of assessment information, to enhance their innovation assessment capabilities in order to activate innovation financing and firmly establish the innovation assessment system. It is necessary for financial institutions to develop infrastructure and experts to understand and use the assessment of TCBs and increase their use. In addition to the efforts of financial institutions, it is important to have appropriate incentives that promote the development of assessment infrastructure through policy measures.

It is also necessary to increase the understanding of innovation assessment by making financial institutions participate actively, even in the early stage of developing innovation financing infrastructures. Therefore, financial institutions such as banks are encouraged to participate jointly in innovation assessment system development projects in order to develop standard models and innovation-assessment-related task manuals. Standard assessment models, DB formats, reports required for the innovation assessment ecosystem, and manuals for the examination of loans are developed and distributed to financial institutions.

Incentives are assigned through policy-finance-related borrowing limits and interest rate adjustments by taking into account the performance of innovation financing and the assessment infrastructure level. In a case where a loan is provided as the result of an innovation assessment by external TCBs, exemptions or alleviation from responsibility are given, unless there is a special reason. Incentives can be provided by raising the scores of the management evaluations if financial institutions, such as banks, actively employ specialty personnel in technology fields and provide specialized assessment teams.

3.2.4. Promotion of the use of innovation assessment information

It is important to promote the use of assessment information to increase transparency and assessment specialization. Technical strength assessment is a mandatory field in loan examination by financial institutions such as banks, but it tends to be assessed arbitrarily and perfunctorily.[11] If an innovation corporation

receives funding through the capital market, or if its technologies change, an objective assessment or related information disclosure is not easily available.

Banks are encouraged to use assessment outcomes produced by TCBs and loan examinations, although technical strength is ultimately determined at the sole discretion of the bank. Assessment outcomes produced by TCBs can be used mandatorily in policy financing because of policy-oriented characteristics. These will be expanded gradually into a general loan examination based on the use of TCB outcomes. These include financial intermediary support loans from the Bank of Korea, on-lending, guarantees by KODIT and KOTEC, etc. If outcomes assessed by TCBs are used in loan examinations for SMEs or enterprises of middle standing, some incentives will be given to these financial institutions.[12)]

There should be encouragement to use assessment information in listings or disclosures in order to protect investors. If a soon-to-be-listed company submits a certain grade of innovation assessment produced by TCBs, it will be regarded as satisfying the technical strength requirement. Items related to a corporation's technical strength, such as business details and business risk contained in the securities registration statement, are described with reference to the assessment outcomes produced by the TCBs.

When this development plan is successfully implemented, we can have a concrete system of information collection, processing, and use. Technical information distributed over many technical fields is collected constantly through information-source organizations and cooperative network development. Then the information is processed through technical information analysis, reclassification, and modularization to suit the use purpose of the TCB or financial institutions.[13)] Ultimately, the innovation assessment outcomes of TCBs are used by loan examiners of banks, in guarantee examinations by KODIT and KOTEC, and in decision-making by investors when making investments.

If the four tasks listed above are functioning well, then the ecosystem of innovation assessments in Korea will look like the system shown in [Figure 1-11]. The TDB accumulates information on technical strength, patent rights, marketability,

11) The credit assessment model used in banks is composed of financial and nonfinancial parts. Technical strength assessment and technical strength items are assessed in the nonfinancial part.
12) Possible areas of incentive mechanisms are the distribution of financial intermediary support loans (formerly known as aggregate credit ceiling loans) by the Bank of Korea, loan limits and interest rate adjustments for on-lending by the Korea Finance Corporation, and adjustment of limits and the guarantee ratio provided by KODIT and KOTEC.
13) Collected technical information is analyzed according to demand by financial institutions and their requirements, and classified and accumulated into technical strength, technical rights, marketability, and trading and assessment information.

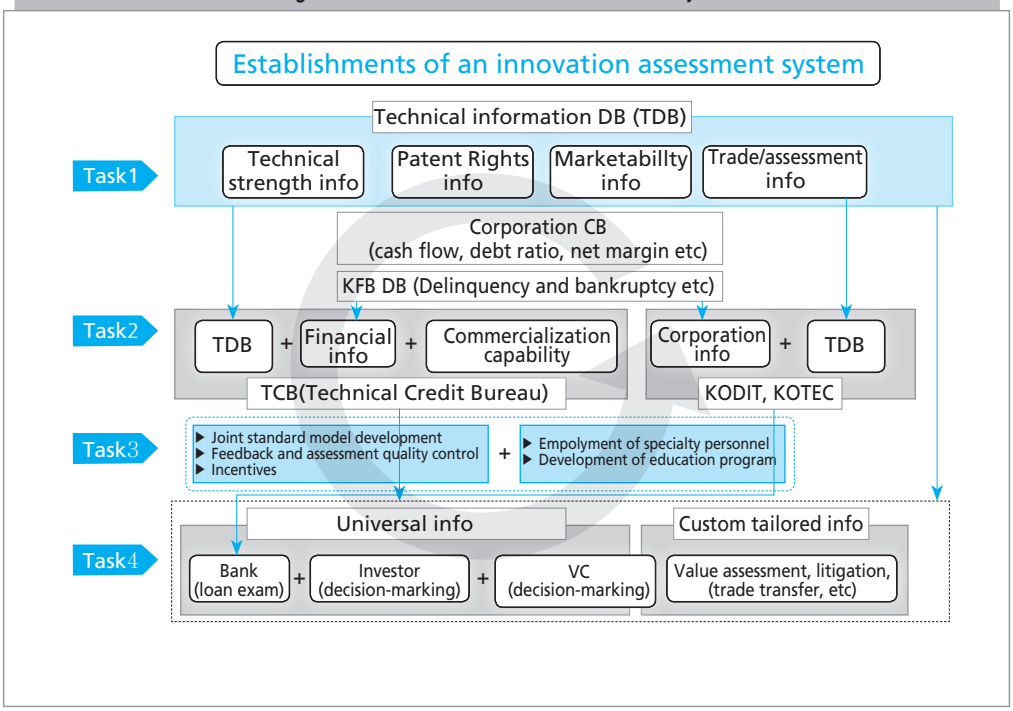
and trade and assessment of enterprises and provides this information to TCBs, KOTEC, and KODIT. TCBs and credit guarantee institutions will perform innovation assessments after performing due diligence on business capabilities using the financial information provided by corporation credit bureau and DBs from the Korea Federation of Banks along with information from the TDB. Information from this innovation assessment is used for credit assessments, investment decisions by investors, and decision-making on venture capital investments, trade transfer, and litigation. The innovation assessment ecosystem interacts with financial institutions, TCBs, and TDBs constantly, and plays a role in flexible networks where innovation and assessment information is shared.

4. Policy Recommendations

Innovation financing is the provision of necessary funds, based on assessments of technology and ideas. Despite various attempts to activate innovation financing, supplied amounts have not been sufficient for innovation- and technology-based enterprises in Korea. This is due to the conservative funding practices of financial institutions, which rely mainly on collateral and guarantees. Another reason for the unsatisfactory fund supply is that the insufficient market for innovation assessment, which is a fundamental element for the success of innovation financing, fails to provide sufficient information on technology and innovation to meet the demands of banks and other financial institutions.

This situation can be applied to the case of Hungary. In Hungary, financing for innovative SMEs is provided by the private sector based on venture capital and funding at a national or EU level, but few instances of credit financing through financial institutions have been reported. One reason for the lack of credit financing among innovative SMEs or start-up enterprises is their low credit ratings; most of them cannot pass the vigorous examinations that are required to qualify for loans. Therefore, few systems exist to supply funding or guarantee credit based on an assessment of innovation and business merit.

[Figure1-11] Innovation Assessment Ecosystem



Source: Korean Government (2014).

Although programs such as Funding for Growth or the SZTA provide finance for SMEs, they do not target innovation-based companies.[14] The JEREMIE Initiative, one of the EU financing initiatives, may be supplied to innovation-based corporations, but this fund is also designed to seek profit, so companies with high innovation as well as high risk may not be approved. Growth Scheme Plus is a program in which the central bank and a commercial bank share the risk, but this fund is focused on traditional sectors such as agricultural and retail industries rather than innovative enterprises. As a result, SMEs with high innovation capabilities are forced to lean on EU funds to survive.

To receive funding from the SZTA, business management capability, marketability and potential, and business plans are reviewed as part of the selection process for investment. For new industrial areas, life science, and ICT, external subject matter experts are invited to judge the technology. The interest rate for this program is lower than that of the JEREMIE Initiative (the interest rate of JEREMIE is 30% per annum while that of SZTA is 10%–15% per annum), and it is not focused

14) However, it is also true that the Funding for Growth Scheme, which is run by the central bank of Hungary, has been improved in terms of financing for SMEs. In recent years, high-risk SMEs that were unable to get funding otherwise have been approved under the Funding for Growth Scheme Plus.

on profit by selling corporations, in contrast with the JEREMIE-financed funds. The main targets of the SZTA are not start-up enterprises; however, this fund may be approved for companies that are restructuring through innovative technologies, considering the previous business outcomes. There is no official database that summarizes credit histories or investment success or failure; an unofficial database could be found but not shared. Even if the Hungarian Venture Capital Association aggregates and stores information each year, it is not possible to confirm whether or not data from a large number of corporations are accumulated.

It is also evident that many corporations waste their time attracting investments without validation or guidance on investment merit based on market competitiveness and business operation capabilities. This is why not only financing support but also support for entry to relevant markets and education are needed to advance SMEs and start-up corporations. Furthermore, a vast amount of data is needed to establish technical and innovative credit bureaus, but no such data are found in current Hungarian industrial fields. Thus, a model similar to the KOTEC model in Korea can be applicable to energy, agricultural technologies, and life science except for ICT in Hungary, and we believe such a model could succeed if the corresponding subject matter experts assess the levels of innovation in enterprises and a low interest rate is ensured.

Becsky-Nagy (2014) explained venture capital investment and growth strategies for technology-intensive SMEs and predicted that those SMEs will play an important role in economic growth in Hungary. However, despite the presence of various funding programs, a number of technology-intensive SMEs in Hungary are not secured sufficiently, so it is also expected that they may not play a major role in economic growth in the immediate future. Karsai (2012) reported that investments in venture capital and private equity in Hungary have increased rapidly in the last 20 years, and 90% of the investment fund now comes from private sectors. However, he also pointed out that this rapid increase slowed down and lost its momentum significantly after the 2008 financial crisis. The OECD (2014) also pointed out that the EU's restructuring support fund for Hungary has moved its focus from an infrastructure-oriented fund to a fund supporting SMEs that are responsible for a significant amount of employment. Cooperation between the EU and the Hungarian government as well as monitoring and evaluating policy outcomes were also identified as important for successful policy changes.

In light of Korea's experiences, having assessment systems is as important as the business content with regard to policy financing for SMEs. When the purpose of policy funds is not to protect and promote SMEs overall but to search for and promote SMEs whose growth potentials are high due to innovative technologies, it is critical to evaluate their innovation, business merits, and potential during the

selection process of beneficiary enterprises. Thus, when policy-financing systems are developed, assessment systems for enterprises and technologies should be discussed while these assessment systems continue improvements and advancement to keep pace with economic and technical environments. It is also important to ensure that financial resources are not wasted through in-depth follow-up regarding the use of policy funds after selecting beneficiaries and supplying the funds; the achievements of corporations should be stored as data to be reflected in future financial support.

To activate innovation financing, it is necessary to develop an innovation assessment system suitable for decisions on innovation loans and investments from the viewpoint of financial institutions. Unlike tangible collateral, the value of intangible technology or innovation is difficult to assess objectively; therefore, grade assessment, rather than value assessment, should be done in the early stage of innovation assessment. Then a TDB, easily accessible by financial institutions, should be constructed to enable the establishment of a TCB that generates innovation credit ratings using the TDB. Furthermore, institutional bases should be broadened to activate innovation loans and expand investments based on innovation value assessment.[15)]

When the Hungarian government establishes an institution or system for evaluating the competitiveness and risks of innovative SMEs and start-ups, it may need to consider the following suggestions.

First, the assessment capacity and loan processing speed of TCBs will be increased by hiring additional specialty personnel and TCB staff and by strengthening TCB assessment information collection.[16)] Innovation financing performance and capabilities should be evaluated for each bank. Various outstanding incentives should be awarded to banks based on the information gathered from assessments.

Second, evaluation of banks in terms of their efforts in innovation financing according to four categories is desirable: the proportion of innovation financing, technology commercialization support, the proportion of credit support, and human resources equipped with specialties. (An example of evaluation items and points is provided in <Table 1-2>.) Consensus on the evaluation should be reached by the banks, and the final assessment items and indexes should be determined through simulation. The final evaluation results should be distributed based on the relative assessment grade among the evaluated banks.

15) Examples include the creation of an investment fund based on an innovation value assessment and the expansion of the size of the fund to recover the invested amount when the investment fails.
16) For example, it is necessary to use intensively collected innovation-related information from TCB assessment documents when assessing similar innovations.

〈Table 1-2〉 Example of Innovation Assessment of Innovation Financing

Evaluation category	Evaluation item
1. Innovation financing	
Proportion of innovation financing	A proportion of the innovation financing* balance compared to the total loan balance for SMEs by bank. * Innovation financing: TCB loans except for guarantee-based loans, loans, and investments based on assessment by innovation TCBs.
Proportion of innovation corporations	A proportion of the number of borrowers using innovation financing compared to the number of total SME borrowers in a bank.
2. Entrepreneurship	
Degree of technical strength use	The average increase of an innovation credit rating compared to the credit rating of borrowers.
Support of newly founded enterprises	The proportion of the number of SMEs founded within seven years compared to the total number of SME borrowers in a bank.
3. Credit financing	
Proportion of credit support	The proportion of loan and investment balance compared to the innovation financing balance in a bank.
Increase rate of credit support	The increase rate in the credit support balance in the current year compared to that of the previous year.
4. Human resources	
Innovation financing specialty personnel	The number of specialty personnel, including skilled employees, those with over three years of technical assessment, and engineering graduates.
	The number of trainees that complete internally or externally commissioned education in relation to innovation financing and training hours.
Innovation financing specialty teams	The presence of innovation financing specialty teams.
	The production performance of innovation financing assessments and innovation-financing-based loans.
Innovation financing examination model	Technical items in nonfinancial assessments of banks are associated with TCB assessment.
	Bank credit rating is adjusted when TCB assesses a superior innovation (credit) rate.

Source: Financial Services Commission (2014).

Third, the innovation loan performance of each bank should be released. In Korea, this information is published on KFB web pages. The performance is divided into KOTEC-guarantee-based loans, Korea Finance Corporation on-lending loans, and the banks' own loans; the number of loans and their amounts should be updated on a regular basis.

Fourth, in order to implement the plan, the Hungarian government could establish task forces (TFs). Through the TFs, collaboration between ministries will be strengthened in order to develop an assessment model from consumer (banks and other investors) viewpoints and to share innovation assessment information. In addition, measures to broaden the use of TCBs in government procurement business and R&D projects should be sought. It is suggested that three TFs be set up, consisting of financial institutions, TCBs, and DB experts: (1) a TDB development TF consisting of DB experts, technical experts, financial institutions, and TCBs, who collaborate in discussing DB configuration, information collection, and sharing methods, (2) a TCB-related preparation TF consisting of preliminary TCBs, financial institutions, and TDB-related parties, who collaborate to develop standard models and assessment procedures, (3) an innovation assessment information use TF consisting of the financial regulatory authorities, thereby providing a measure of reflection on the credit assessment model, the development of the work manual, and its use in listing and disclosure. An example of the schedule for the implementation plan is provided in <Table 1-3>.

〈Table 1-3〉 Implementation Plan Schedule (example)

Category	January	March	May	September	December
TDB founding	TDB founding Driving unit started	Provide TDB operating plan	TDB founding, employment of personnel	Computer system construction	
DB construc-tion	TDB development/TF configuration Analysis of assessment tasks and demand		DB architecture development MOU with information-holding organizations	DB construction	
Standard model develop-ment, etc.	Analysis of demand, such as the credit assessment model Research outsourcing for standard model development		Provide use plan for banks, etc. Develop and complement standard model		Work manual development

Source: Korean Government (2014).

Fifth, it is worthwhile to consider the consultation and advertisement of innovation financing, including options related to both financial institutions and venture capital. Success stories should be actively sought through the "innovation finance best practices competition," with awards and incentives given to excellent cases.

Two of the most important considerations while supplying policy funds are the selection of beneficiary corporations and post-evaluation. To increase the efficiency of policy funds, it is quite right that enterprises whose potential growth is high receive all the benefits of policy funds. Therefore, the assessment of potential growth regarding beneficiary candidates should be objective, and a transparent selection process should take place based on objective assessments.

The KIBO Technology Rating System (KTRS) is a good example of such an effort (see Appendix 2 for a brief description of KTRS). However, this does not mean that KTRS is well suited to innovation assessment systems in Hungary. Instead, similar to the way in which KIBO developed KTRS to reduce the credit guarantee default rate and select better beneficiary enterprises and introduced the "KTRS Feedback System" to raise the reliability of the developed assessment system, Hungary needs to study their own assessment systems to produce better results with limited financial resources and further improve existing systems.

Because KIBO's data collection has continued for a long time, studies on these data are thriving as well. Kim *et al*. (2013) studied the macroeconomic variables that most affected corporate bankruptcy to set the main variables in the innovation assessment model based on previous studies. They restructured the model, comparing it with existing models for improvement. Lee (2010) identified innovation assessment factors that can influence the survival of SMEs that receive technology guarantees via a survival analysis using the innovation assessment data from KIBO and established the bankruptcy prediction model. Kim and Yi (2011) analyzed the start-up enterprise data in KIBO and verified that approval of guarantees was positively correlated with guarantee-related performance such as employment and investment regardless of the guarantee received, the duration of the guarantee received, or the guarantee amount. The results indicated that an approved guarantee could result in additional performance gain, and guarantee institutions improved funding capabilities of corporations that received guarantees by eliminating the asymmetry of information via thorough monitoring.

However, even after fund beneficiaries are selected, an in-depth follow-up should be continued to determine whether policy funds are used in accordance with the fund goals. Thus, if related data are collected to be used as important foundations in improving future assessment systems or determining future policy

directions, the waste of assisted policy funds can be prevented and more-efficient resource allocation can be achieved.

The prerequisite of adoption and improvements of such assessment systems or observation and analysis on beneficiary enterprises is to secure human resources that can assess enterprises and their innovations and analyze their performance. In general, without the human resources necessary for competent assessment and analysis, any assessment system will fail because the assessment and analysis of enterprise innovation and potential requires subject matter expertise. Such innovation assessment experts not only evaluate subject matter in science and technology as well as any innovative fields, they are also employed as a human resource pool to plan and run national R&D projects over the entire field of national R&D. Thus, the development and advancement of assessment systems must be parallel with the development of human resources who can run and apply the systems.

The default risk can be alleviated if enterprises are assessed based not only on credit but also on their innovation; this concept was proven theoretically. Fostering human resources for innovation assessments and securing expertise are also important in parallel with the development of innovation assessment infrastructure. Finally, accumulating information regarding innovation assessment is important as well as coordination between interested parties to use the accumulated information.

5. Conclusion

Although start-ups and SMEs possess innovative technologies that could potentially be well received commercially, they face difficulties in terms of funding due to poor credit evaluations or low collateral. If their innovation is assessed along with existing credit assessments upon approval of their loan applications, this policy change may support innovative firms and use their potential as the nation's growth engine, not only for advanced countries but also for emerging market countries as well.[17] This chapter reviews the status of innovation financing in Hungary and South Korea and proposes policy measures to expand innovation financing in Hungary based on the policies in South Korea over recent years.

17) Park and Lim (2015) empirically verified that using innovation assessment information can be helpful for credit risk management to predict innovative enterprise default from the viewpoint of banks or guarantee institutions. The results of default prediction with respect to more than 10,000 enterprises that applied innovation assessments guaranteed by KIBO in 2007 and 2009 showed that prudential regulation of loan and guarantee institutions improved significantly if innovation assessment information was used.

It took a long time for Korea to construct the technological evaluation system that exists today, and Korea has learned a lot through trial and error in the process. Some of Korea's experiences include inaccuracy of review for guarantee deals due to the lack of a technological evaluation system, experiences with and responses to high delinquency rates caused by excessively generous guarantees, difficulty in obtaining and nurturing professional human resources for technological evaluation, responses to the challenge of constructing a collaborative system among relevant institutions to create a technology database, and coordination of interests related to technology credit bureaus. While many of these difficulties were overcome by the current evaluation system for innovative businesses, the need for further improvement remains. Surely, in Korea to date, it has been difficult to demonstrate one's achievement with respect to innovation finance because its ecosystem has been implemented only recently.

However, the Korean government and a research institute have assessed the performance of innovation finance and released its results in May 2015. According to Seo and Lee (2015), since the government encouraged domestic banks to deal with technology financing through technology evaluation, the size of deals related to technology financing has increased. However, new transactions involving borrowers of technology credit with no transactions during the previous year accounted for just 28.4% of the total amount funded. Additionally, businesses with excellent technological strength comprise just 13.1% of the total loans; loans with a rank of T7 or lower (indicating a lack of technological strength) make up 6% of the total. Support for small businesses having difficulty with financing is 22% of the total, and 73.5% of the loans has a short repayment period (within a year). These survey results indicate that when demand for technology evaluation increases rapidly, the quality of the technology evaluation falls, and technology financing can be made only in classification even without a thorough evaluation. In addition, when evaluation staff is unable to meet too much demand, an additional 15 days is needed to initiate loans and accordingly the dissatisfaction of small businesses increases. Only when loans are actually made to evaluated firms, the innovation evaluation fee can be recognized as a cost for a loan, which can be more than offset by interest income received from the firms; therefore, banks have incentive to welcome over-evaluation, and TCBs tend to be generous in giving high-technology credit to an evaluated firm.

Based on the experience with loans made to innovative technology companies in Korea, we must be cautious when designing and activating this ecosystem of innovation financing based on innovation credit assessments.

First, enforced allocation of innovation financing loans should be avoided. Rather, designing and providing incentives for banks with high performance of

innovation assessment is desirable. For government-driven financing for innovative SMEs to be more effective, it is important that assistance from financial markets be based on market principles. Guarnaschelli *et al*. (2014) argued that the core of innovation financing is not loan assistance through innovative funding techniques; rather, it is to create a social environment through partnership between private and public sectors, emphasizing the importance of financial assistance via market principles. Jones and Kim (2014) discussed the financial policies for innovative SMEs in South Korea, stating that financial assistance for the venture capital market is not functioning as intended and arguing that any negative effects derived from policy-financing assistance should be minimized through financial assistance based on market principles rather than policy-funding schemes. Ilyina and Samaniego (2008) proved that rapidly growing industries in countries with advanced financial development resulted from intensive R&D investments as they paid attention to the fact that financial assistance benefits were different from industry to industry. The results of their study imply that well-developed financial markets affect the R&D investment and growth rate of specific industries.

Second, there might be a concern that promoting innovation-assessment-based loans may result in an increased delinquency ratio. However, loan approvals will ultimately be determined at the bank's own discretion, according to innovation assessment outcomes. The main purpose of innovation assessments that are mandatory in relation to policy financing is to avoid providing loans to corporations with high insolvency rates. This will increase the accuracy of default rates when a bank makes a decision on providing loans. In addition to conventional financial information, innovation information will be used to increase the accuracy of credit determinations and estimations.

Third, in addition to building up the innovation assessment system, policies that support the promotion of innovation financing should be considered. For instance, an excessive innovation assessment service fee should be avoided to relieve the burden of assessment service fees on banks. When banks provide loans based on innovation assessments, some funds can assist in subsidizing the interest rate gap to reduce the burden on corporations that have technical strength but lack collateral. In addition, the TCB-assessment-based loan performance of each bank can be considered to be under review to facilitate the settlement of innovation financing and identify the difficulties experienced by financial institutions.

Fourth, it is also important to evaluate the effect of TCB-related policies comprehensively and raise concerns and potential issues that may occur in the future. Furthermore, additional policies may be required that can induce long-term stability of loans and guarantee schemes based on innovation assessment information such as assistance with assessment fees or credit risk sharing such as

securitization.[18)]

The goals of the innovation assessment system are to increase the funding opportunities available to innovative start-ups and SMEs. The innovation assessment system will support the decision-making of banks and guarantee institutions. After this plan is implemented, technical strengths are assessed using the assessment information from specialty innovation TCBs in the credit assessment and loan examination processes. In addition, innovation assessments will be conducted using relevant information provided by external TCBs, thereby increasing the objectivity and specialty of the innovation assessment. Guarantee institutions and banks will use specialty innovation assessment information during the examination process.

Ultimately, financial support for the real economy is expected to strengthen, and the soundness of financial institutions is expected to enhance. Assistance with sufficient seed funding and required growth capital is provided through objective assessments of creative knowledge, including technologies and ideas. An important foundation is provided for the activation of investment financing, the innovation assessment capability of financial institutions improves, and a combined investment and loan system is developed. A potential fund is provided to reward excellent innovation companies and strengthen the protection for investors by listing, disclosure, and security issuance based on a specialty innovation assessment. Objective examinations of technical strength result in reduced risks for loans and investments and the creation of new financial demands specific to innovative ventures and SMEs.

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18) Park and Lim (2015) pointed out that premises that should have been checked before the start and expansion of TCB loan programs in South Korea were not examined closely. That is, they reported that there was no in-depth review of definitions and characteristics of innovation finance or the current status of financing for innovative SMEs and barriers. This has led to confusion in the market and a lack of understanding and consensus between experts and interested parties regarding definitions, practices, and characteristics of enterprise innovation assessments. Therefore, Park and Lim propose an in-depth overhaul of the system.

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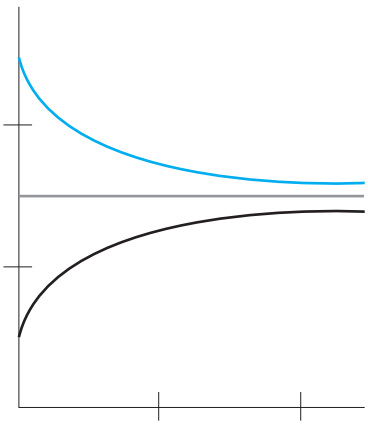
Appendix 1: A Theoretical Model of Market Failure Assessment in Small and Open Economies

This model is constructed to describe problems that derive from the lack of market information. They will serve as proof of existing risks, and they will attempt to identify these risks.

The function provides a base for the model and, therefore, provides a proper definition of the function and its requirements are of crucial importance. Either pure progressive ([Figure 1-A1], black line) or pure regressive ([Figure 1-A1], blue line) expenditures are considered. The desired aims could not be approached owing to the effects of the black economy in the progressive case and the effects on low-income taxpayers in the regressive case. Linear expenditures ([Figure 1-A1], gray line) from these aspects might be better to use, but they do not necessarily imply releasing sources from the hidden economy.

[Figure 1-12] Pure Regressive (Blue), Pure Progressive (Black), and Linear (Gray) Expenditure Function



A model-based approach

A few details of the designed system have already been discussed. The requirements for establishing the model discussed are hereby presented in detail below.

(1) *Continuity*: If different tax rates in different bands are used, then instead of a fragmented outcome, the function like model is much more equable. Let this

function be $t(x)$; it describes what expenditures should be incorporated by the taxpayers under some revenue conditions. Therefore, it is quite important that structural breaks not be presented.

(2) *Progressivity*: Another important aspect of this function is that below some limit, it should show progressive properties.

(3) *Revenue*: The state should provide the same revenue as it would have presented in the previous model in the same timeframe.

(4) *Sum solidarity*: Not the tax rate but the tax sum for all $x_1 > x_2$, $t(x_1) \cdot x_1 > t(x_2) \cdot x_2$ should be satisfied as high-income taxpayers should nominally pay more than low-income taxpayers. This is mathematically defined as $\frac{\partial t(x) \cdot x}{\partial x} > 0$.

From the above-mentioned criteria, we can obtain a preliminary form of the function: it is quite similar to a distribution function, more closely resembling the distribution function of a log-normal distribution. The main difference is that the tail of the distribution does not converge to 0 but to some constant value.

Doubts expressed over the model:

- There is no evidence that the revenue function should show regressive properties. In this case, the optimal function could be a progressive one.
- There is no guarantee that the black economy has the power to compensate for the loss of revenues.
- Should the function remain regressive, we still have to define its parameters (drop, limiting value, etc.).

These are well-founded doubts, and, therefore, they cannot be disregarded in the model's setup. Therefore, a general model should be designed first, in which it is allowed that a function is progressive, regressive, or progressive-regressive. The optimal expenditure function $[l(x)]$ in the given economy and even timeframe can be deducted only from this model framework.

The model

While designing the model, we can basically start with two approaches. The first one is to calculate $l(x)$, the optimal expenditure function through the budget, and fit it to the need of society. The other option would be to calculate a social optimum, and fit it to state expenses. Both approaches have their own advantages

and disadvantages. The main disadvantage of the second approach is that it is difficult to quantify something when people hardly know what the best option for them is, or there are too many alternatives, and it is extremely difficult to choose the optimal one. Therefore, public expenditure should be the starting point.

The base of the model is a game. Assume that the game has N rounds. All rounds correspond to one year in the economy. Let $l(x)$, be the new expenditure and $t(x)$ be the old expenditure. All N rounds are played.

The game

Let Y_i be the state revenue in the year. Then, Y_i^n shows the state revenue with the new model and Y_i^o, that with the old one.

To compute Y_i^o, we need a complex dataset on certain properties of the white economy. Therefore, let $f_i(x)$ be the distribution function of taxpayers in a given year in the white economy. Then, Y_i^o is

$$Y_i^o = \int_0^\infty f_i(x) \cdot t(x) \cdot x \cdot dx.$$

To define Y_i^n, we need different types of data[$l(x)$ will be calculated recursively; in this phase, we assume that it is already known]. On the other hand, we need further statistical data beyond $f_i(x)$. Let $s_i(x)$ be the income distribution function in the gray economy in year .

There should also be a correction factor, which again is not considered to be constant, but to be different for different income levels. This correction factor is applied to the willingness itself, as it specifies that at income level what ratio of taxpayers are willing to make an effort in the new system. Let $k_i(x)$ be this correction factor in year . By applying mutatis mutandis, we get

$$Y_i^n = \int_0^\infty l(x) \cdot s_i(x) \cdot k_i(x) \cdot x \cdot dx.$$

The determination of $s_i(x)$, $f_i(x)$, and $k_i(x)$ is fairly easy in the base term, as we have some statistical data that can be used. In this model, we are assuming that under the same conditions in the economy, these distributions do not change and only shift according to the GDP growth. In other words, the original form of these distributions is constant, but it changes in the new system. This change is shown by the function of willingness, $k_i(x)$.

Therefore, the following integral equation should be solved:

$$\sum_{i=1}^{N} Y_i^n \geq \sum_{i=1}^{N} Y_i^o = N \cdot \int_0^{\infty} f_1(x) \cdot t(x) \cdot x \cdot dx.$$

Correction factors: Growth and outflow

Thus far, except for the integral calculations, the calculations were relatively simple. A constant closed economy is assumed, where an endless number of subjects of taxation is not characteristic. However, this is far from reality, especially ifour model is used in a small and open economy like Hungary. During the further development of the model, it is assume that the present GDP growth is known precisely, and reliable projections are presented of the next N years. Based on this, let g_i^o be the GDP growth rate in year in the old model.

Based on the above,

$$n_i(x) = \frac{p_i(x)}{p_{i-1}(x)} - g_i^o ,$$

where $n_i(x)$ is the additional growth that affects taxpayers (as a result of the change) at income level x in year i, and $p_i(x)$ is the earnings in the new system at income level x in year i[per definition, if $i = 1$, then $p_1(x) = x$].

If we assume i-1 to be the base, then at the end of year i,

$$n_i(x) = \frac{(1+r_f)\cdot \text{profit deriving from model change}}{x}.$$

The earnings from the model change are easy to compute:
$t(x) \cdot x - l(x) \cdot x = x \cdot \big(t(x) - l(x)\big)$t(x). Thus,

$$n_i(x) = \frac{(1+r_f)\cdot x \cdot (t(x)-l(x))}{x}.$$

As it is an open economy, a part of the extra money not calculated thus far will leak out of the country:

$$n_i(x)^{\square} = \frac{(1+r_f)\cdot(1-K)\cdot x \cdot (t(x)-l(x))}{x} = (1+r_f)\cdot(1-K)(t(x)-l(x)),$$

whereas

$g_i^n = g_i^o$ + proportion of income as a share of GDP · growth deriving from profits.

Therefore, the GDP growth rate in the new model in year i, (g_i^n) is

$$g_i^n = g_i^o + \frac{\int_0^\infty s_{i-1}(x)\cdot x\cdot dx}{\mathrm{GDP}_{i-1}}\cdot\frac{\int_0^\infty n_i(x)\cdot s_{i-1}(x)\cdot x\cdot dx}{\int_0^\infty s_{i-1}(x)\cdot x\cdot dx} - 1 = g_i^o + \frac{\int_0^\infty n_i(x)\cdot s_{i-1}(x)\cdot x\cdot dx}{\mathrm{GDP}_{i-1}} - 1$$

Correction factor:Income $Y_i^n = \int_0^\infty l(x)\cdot s_i(x)\cdot k_i(x)\cdot x\cdot dx,$

Based on the above, year N state income based on the new method can be easily corrected with GDP growth:

$$\widetilde{Y_i^n} = \int_0^\infty l(x)\cdot\frac{s_{i-1}\left(\frac{x}{1+g_{i-1}^n}\right)}{1+g_{i-1}^n}\cdot k_i(x)\cdot x\cdot dx = \int_0^\infty l(x)\cdot\frac{s_1\left(\frac{x}{\prod_{p=1}^{i-1}(1+g_p^n)}\right)}{\prod_{p=1}^{i-1}(1+g_p^n)}\cdot k_i(x)\cdot x\cdot dx.$$

The calculation of the old method should be corrected as well. Thus $f_1\left(\frac{1}{1+g_i^o}\right)$, in point of fact:

$$\widetilde{Y_i^o} = \int_0^\infty \frac{f_1\left[\frac{x}{\prod_{p=1}^{i}(1+g_p^o)}\right]}{\prod_{p=1}^{i}(1+g_p^o)}\cdot t(x)\cdot x\cdot dx.$$

Thus, the corrected model is $\sum_{i=1}^{N}\widetilde{\boldsymbol{Y_i^n}} \geq \sum_{i=1}^{N}\widetilde{\boldsymbol{Y_i^o}},$

$$\sum_{i=1}^{N}\int_0^\infty \boldsymbol{l(x)}\cdot\frac{\boldsymbol{s_1}\left(\frac{\boldsymbol{x}}{\prod_{p=1}^{i-1}(\boldsymbol{1}+\boldsymbol{g_p^n})}\right)}{\prod_{p=1}^{i-1}(\boldsymbol{1}+\boldsymbol{g_p^n})}\cdot\boldsymbol{k_i(x)}\cdot\boldsymbol{x}\cdot\boldsymbol{dx} \geq \sum_{i=1}^{N}\int_0^\infty\frac{\boldsymbol{f_1}\left[\frac{\boldsymbol{x}}{\prod_{p=1}^{i}(\boldsymbol{1}+\boldsymbol{g_p^o})}\right]}{\prod_{p=1}^{i}(\boldsymbol{1}+\boldsymbol{g_p^o})}\cdot\boldsymbol{t(x)}\cdot\boldsymbol{x}\cdot\boldsymbol{dx}$$

It is important to note that the model established is as general as possible. This is why functions and integrals are used for the calculations, as an economy with an endless number of participants is assumed.

As can be seen from the equations, $l(x)$ can only greatly differ from $t(x)$ if $f_i(x)$ greatly differs from $s_i(x)$. It should be considered that once such a system is implemented, it should not be maintained for too long because it could further increase social satisfaction.

Appendix 2: Overview of the KIBO Technology Rating System(KTRS)[19)]

In this appendix, KTRS, which is the innovation assessment system of KIBO, is introduced. Most enterprise assessment systems are operated through credit assessments. However, technology-based and innovative enterprises are disadvantageous in terms of good financial assessments. This is especially true for start-up companies, which is why they have difficulties achieving recognition in the market. Furthermore, their technology assets may be difficult to reflect in the market due to information asymmetry. KIBO has developed an innovation assessment system called KTRS, through which the potential commercialization of innovation enterprises is rated based on technology merits, marketability, profitability, and other business environments, excluding financial indexes.

KTRS is a model used to determine the potential commercialization of innovation by measuring future growth potential and default possibilities of an enterprise and associated technologies. The grade is calculated based on a technology assessment table consisting of 33 items that can evaluate main business capabilities, technical merits, marketability, and profitability.Internal environment variables include years in business, main business area, age of CEO, number of employees, and own factory or not.External environment variables include the SME manufacturing production index, the leading composite index, the KOSPI, the average manufacturing capacity utilization index, government bond yields, business survey index, and won-dollar exchange rate. With respect to the 33 items, the KTRSSM, which is a model for start-up enterprises (within five years after business start), consists of 23 items. Conversely, KTRSBM, which is a model for small enterprises (more than five years after business start and less than 1 billion won of annual turnover), consists of 18 items.

The assessment indexes used in KTRS were developed through assessment results conducted for five years based on the technological merit assessment model that was developed with the Small and Medium Business Administration in 1999 as well as overseas case studies and expert consultation. To increase reliability and consistency of the assessment, the "KTRS Feedback System" was adopted to minimize deviation and prevent errors due to subjective scoring. One of the strengths of KTFS is it can be easily adjusted or modified in accordance with use,

19) This appendix is provided by Juyoung Song and Heechang Park at KOTEC, extracting from the 2014 Vietnam KSP final report (not published yet). Some of the contents were rewritten by the authors and them to be relevant to the 2014 Hungary KSP topic.

purpose, or goals. It has been improved and advanced continuously since its development in 2005. The assessment indexes of this system can be used differently as policy fund criteria for innovative SMEs depending on the use, purpose, or business area.

1. History of KTRS

KOTEC developed the KTRS in July 2005. Before launching KTRS, KOTEC used a simple technology rating process called "technology evaluation checklist" since 1995. KOTEC opened the Technology Appraisal Center in 1997 and introduced a technology appraisal guarantee program in 1999. Subsequently, KOTEC has gradually improved the technology evaluation checklist by analyzing the correlation between the result of evaluations and the performance data of client companies, because it is difficult to prove the checklist-based evaluation's validity and track down the evaluation results. After six years of research on the simple technology rating process, KOTEC launched KTRS in July 2005.

KTRS is a useful screening tool to evaluate technology—or knowledge-based SMEs who lack sufficient financial records. As this system quantifies a company's prospects in terms of a technology-rating grade, the final grade is enough to determine whether a company will be supported for a loan guarantee.

KTRS differs from a conventional credit rating system in many aspects. While a conventional credit rating system focuses on the financial conditions and historical data of companies, KTRS accommodates the nonfinancial aspects of a company, such as the technology business feasibility, with an emphasis on its potential. In this sense, KTRS is suitable to KOTEC's business goal, which is to identify and support companies having technology business potential.

Recently, KTRS moved from being used just an internal screening tool for providing loan guarantees to being used as a more general tool for independent businesses such as Technology Certificate and Technology Credit Bureau Data.Now, KOTEC aims to position itself as an information provider to other key independent players such as banks, venture capitalists, and R&D institutions.

〈Table 1-4〉 Brief History of KTRS

Date	Classification	Promotion details
December 1999	Old model	Develop general technology evaluation model (prototype)
July 2005	Implementation of KTRS	Reflect the research result
December 2005	Patent application	Apply for a domestic patent for a technology evaluation system
December 2006	Overseas patent application	KTRS PCT international patent application
April 2007	Patent registration	KTRS domestic patent application (No. 10-0713546)
August 2008	Improve KTRS	Enhance and implement the evaluation index (KTRS-v1.3)
November 2008	KTRS SM implementation	Develop and implement the evaluation model for start-ups
November 2008	International patent application	KTRS international patent application (Singapore)
December 2008	R&D evaluation model	Develop and implementR&D evaluation model
October 2009	Patent registration	KTRSSM domestic patent model (No. 10-0921618)
August 2010	Patent registration	Domestic patent application of KTRS feedback system (No. 10-0976054, No. 10-0986889)
January 2011	KTRS upgrade	Application of proposal for enhancing KTRS (KTRS-v2.0)
January 2012	KTRSSM	Expand the application scope of KTRSSM from three years to five years after the business establishment
April 2012	Youth start-up model	Developand implement youth start-up evaluation model
August 2012	Convergence evaluation model	Develop and implement KTRS into the detailed evaluation model

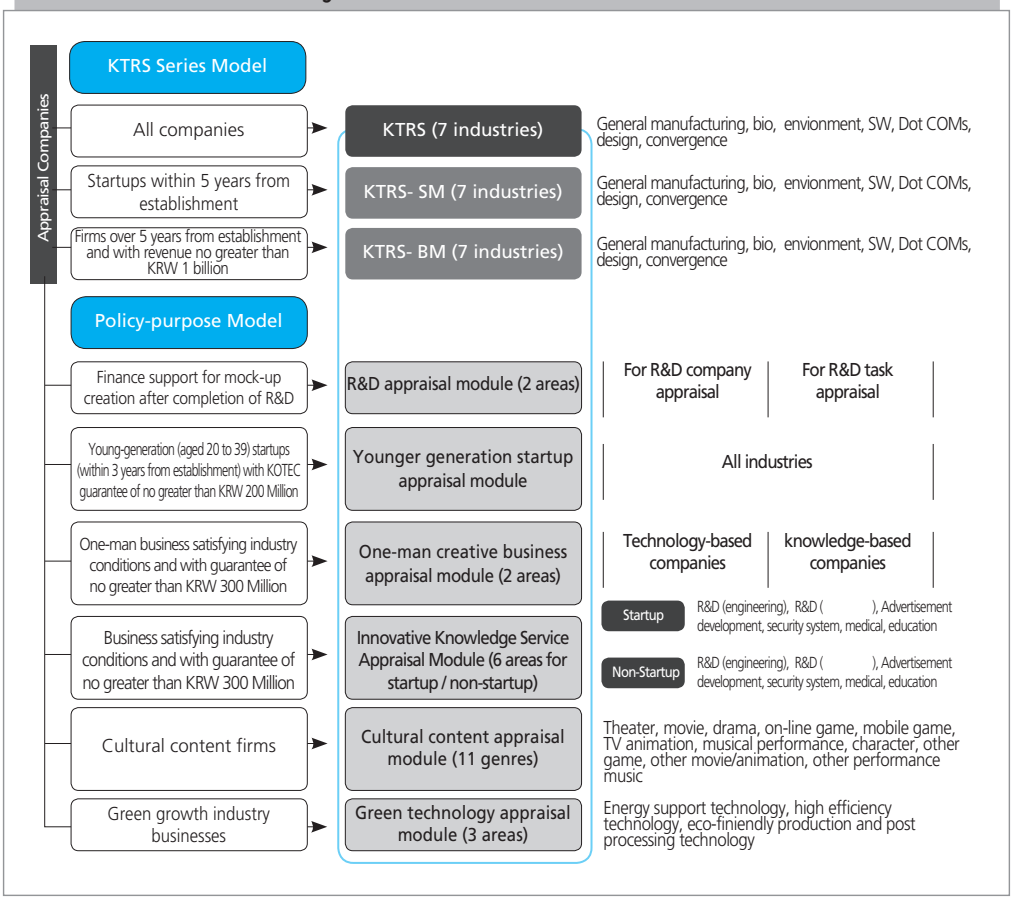
〈Table 1-4〉 continued

Date	Classification	Promotion details
January 2013	Improve KTRSSM	The first enhancement of KTRSSM - Develop technology evaluation index for seventypes of businesses - Develop the calculation method for business growth potential and enhance the calculation method of risk level, etc.
March 2013	Develop KTRSBM	Develop technology evaluation index for seven types of businesses - Changeto the same calculation method as KTRSSM from the existing AHP (analytic hierarchy process) weighting-based calculation method for rating
January 2014	Improve KTRS-affiliated model (KTRS, KTRSSM, KTRSBM)	Enhancethe technology evaluation rating model and reestablish the system - Maintain the consistency of the technology evaluation index and the calculation method among KTRS-affiliated models
July 2014	Evaluation model for preliminary start-ups	Develop and implement the evaluation model for preliminary start-ups

2. Key Components of KTRS

KTRS is a technology business feasibility evaluation model that assesses enterprises and their technology with regard to their future growth potential. For the purpose of policy support for technology finance, KOTEC operates two tracks (KTRS and policy-purpose models), ten categories, and 53 subcategories below according to the business or industry.

[Figure 1-13] KTRS Evaluation Framework



The critical part of KTRS is the set of indicators used to evaluate the technology and business prospects of a subject company or technology. These indicators are largely composed of four modules: (1) management potential, (2) technology prospect, (3) market feasibility, and (4) business/profit prospect.

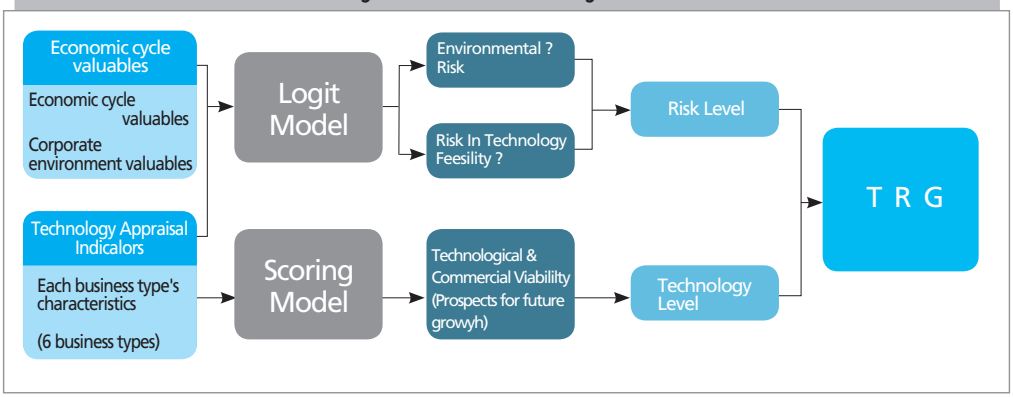
Furthermore, each module is classified into 33 evaluation indicators. The start-up model (KTRSSM) has 23 items, and the basic model for small businesses (KTRSBM) has 18 items scored from A to E (five grades) according to the internal manual set by KOTEC. Another noteworthy aspect of KTRS is that it is customized to represent the differences in industry sectors, classifying the indicators into seven groups from general manufacturing to the software industry. These indicators were initially derived from the "evaluation checklist" and a consensus of experts on key corporate success factors; however, they have been refined or restructured over the years. Every indicator is an important input variable used in determining the final KTRS

grade (from AAA to D).

The final grade is based on a weighted combination of the technology level and the risk level. The technology level is the quantification result of the company's technological and commercial viability. Any particular company's technology level is determined from how it is rated against a number of different indicators. The final technology level is determined from a weighted combination of these indicator ratings as performed using an AHP analysis. In fact, these weightings and indicators can be different for different industry sectors. The real key to a good technology-level rating is the correct determination of these weightings.

The risk level is a quantification of the risk associated with three major factors: evaluation results of the indicators, the company's own commercialization risks, and external risks in the environment (i.e., economic cycle, etc.). Macroeconomic environment variables are input to account for the external risk. The risk to commercialization is determined from the indicators used earlier. The actual risk level is determined by the application of a statistical logistic regression model that is based on the input data and results accumulated from the analysis of technology appraisal cases that have been performed previously.

[Figure 1-14] KTRS Rating Process



20) The major features of the KTRS approach are quoted from the European Commission, "South Korea SME Innovation Support Schemes: Final Report on IPF Review to South Korea," April 2012, document ID IPF 12-2013.

3. Major Features of the KTRS Approach[20)]

Most technology-rating systems include similar benchmarks, at least to some extent. The greatest challenge with the technology rating is that technology is difficult to quantify, and the rating heavily relies on the appraisers' expertise. Accordingly, financial institutions have separately conducted technology rating and credit analysis, whereas KTRS integrates PDs in the rating methodology. Despite being a nonfinancial model, KTRS has managed to minimize the discretionary or arbitrary assessment of the appraisers. The EU IPF report describes KTRS as per below.

Removing assessor subjectivity

One of the important success factors in KTRS and another good practice is the strong focus on the removal of the assessor subjectivity from the appraisal. This has been approached from two angles: (1) attempting to make more of the assessment indicators objective and/or quantitative and (2) calibrating the assessors and feedback to assessors relative to others. It is recognized that the minimization of the assessor subjectivity is very important in establishing trust in our system. This approach of providing feedback to assessors could probably be used in many programs that require an assessment as part of the evaluation procedure. Because the feedback is based on a statistical analysis of an assessor performance over all their assessments and relative to other assessors, it is essential to record assessment results electronically and store them internally in sufficient numbers to allow a valid statistical analysis.

Tailoring the system to different sectors and uses

Considerable efforts have been made to adapt the system to better suit different sectors, and currently, various models are used for seven different industry sectors. A good illustration of the commitment to the constant development of the approach is the recent development of the model for the cultural contents industry, as described above. It is also worth noting that there are existing models or models in the development stage for start-ups, knowledge-based service industries, and one-person enterprises.

Sustainable developing system

The KTRS system is a "growing" system in that it is constantly being refined and adapted to make it easier to use and more reliable and suitable for different uses. This dedication to the constant refinement of the system is another good practice

and an important factor in establishing the success of the approach. In 2013, the system included an analysis on the correlations between the KTRS grade and the probability of business growth (i.e., revenue and employment) beyond the existing analysis on the correlations between the KTRS grade and the PDs (probability of defaults).

2014/15 Knowledge Sharing Program with Hungary:
Strategy for Crisis Management and Economic
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Chapter 2

Public Employment and Vocational Training System for Effective Use of Human Resources

Public Employment and Vocational Training System for Effective Use of Human Resources

Minsik Choi (Ewha Womans University)

Summary

The radical changes in the economy and society during 1989–1990 resulted in essential changes in the labor market as well. As the Hungarian economy experienced a substantial decrease in production and more intensive use of the labor force under the new conditions, the population's economic activity decreased significantly and has remained inactive for a long time. The 2008 world economic crisis hit the Hungarian economy and labor market, which had been growing constantly since early 2000, and the Hungarian GDP and employment started to decline.

Even though the Hungarian government has recently implemented various active labor market measures to improve the labor market conditions, there remain many challenges in implementing further labor market reform. Low employability, a high youth unemployment rate, and a significant gender gap in employment are the most serious challenges. The lack of sustainable funding for active labor market programs such as public employment service and skill-development programs is also one of the major difficulties.

The main task of this KSP project is to determine a direction for reform of the Hungarian public employment and vocational training system for effective use of human resources by analyzing Korea's experience.

The Korean public employment service and vocational training programs along with the other active labor market measures were considerably reorganized and expanded to deal with imminent massive unemployment when the 1997 Asian financial crisis hit the country. The prompt and extensive responses by the Korean government were all possible, thanks to the timely set up of the Employment Insurance System (EIS) in 1995. With the EIS funding, the Korean government provides only unemployment benefits, but it also expanded public employment service, public work programs, and other job training programs to help the unemployed find new jobs. Unlike unemployment insurance systems in many developed and developing countries, the Korean EIS was implemented as a comprehensive system covering the employment stabilization program, the vocational competency development program, and the unemployment benefit program.

In order to improve the employability of vulnerable groups, the Korean government launched two programs that offer comprehensive service combining vocational training and welfare programs—the Successful Employment Package Program and the Hope Ribbon Project—and these two programs have had positive effects on improving the vulnerable groups' employment. These programs seem to provide some significant implications for the Hungarian government's labor market reform, since Hungary also suffers from low employment and lack of skills among its vulnerable groups. As we saw in Korea, the one-stop-service system for employment and vocational training expanded to include nontraditional welfare services such as credit recovery counseling as well as a welfare counseling service. It is also crucial that the public employment and vocational training service provide services for employers. Like most developed countries, the Korean government also provides subsidies and information service for employers with its public employment service and job training service system.

With help from the recent development in information technology, many countries have tried to make their public employment service and vocational training service user friendly by setting up online-based service systems. Korea's Work-Net and HRD-Net are good examples that the Hungarian government could consider setting up. With this online-based service system, people can access the service easily and timely.

Additionally, individually focused comprehensive services including public employment, vocational training, and welfare can be more effectively delivered through an online-based system because it enables the compilation of all the relevant individual data without substantial effort and cost. Among the various services available through an online-based system, the most common services are personalized information on online job applications, human resources

management, and recruitment support services such as applicant-selection services and recommendation services for suitable vocational training programs. In Korea, the intranet- and Internet-based services not only help find recruiters, they also provide help for various services for youth work experience aids and social service jobs. There are also group-counseling services such as achievement programs, youth vocational-guidance programs, and job-seeking programs.

1. Introduction: Hungarian Labor Market Transitions

At the turn of the 1990s, radical political, economic, and social changes took place in the central and eastern European countries. Accordingly, Hungary underwent considerable socioeconomic changes for the last 25 years. The changes in the international environment—the accession to NATO and becoming an EU member in 2004—played particularly important roles in shaping today's Hungary.

The radical changes of the economy and society during 1989–1990 resulted in essential changes in the labor market as well: the full employment era ended, and the unemployment rate started increasing constantly. As the population's economic activity decreased significantly, the number of employees declined by 1.4 million, which is 27% of the total labor force. Among others, the closure or transformation of enterprises and cooperatives is the main cause of the decline. As the Hungarian economy experienced a substantial decrease in production and a more intense use of the labor force under the new conditions, the number of economically inactive people rose. In order to avoid unemployment, a large number of people chose pensions or some kind of retirement provision, while young people remained in school longer than usual, hoping for better chances for employment. After 1998, the number of inactive people fell slightly, but 2.6 million people age 15–64 still remained inactive in 2009. The number of inactive people has increased by 7% (166,000) since 1992.

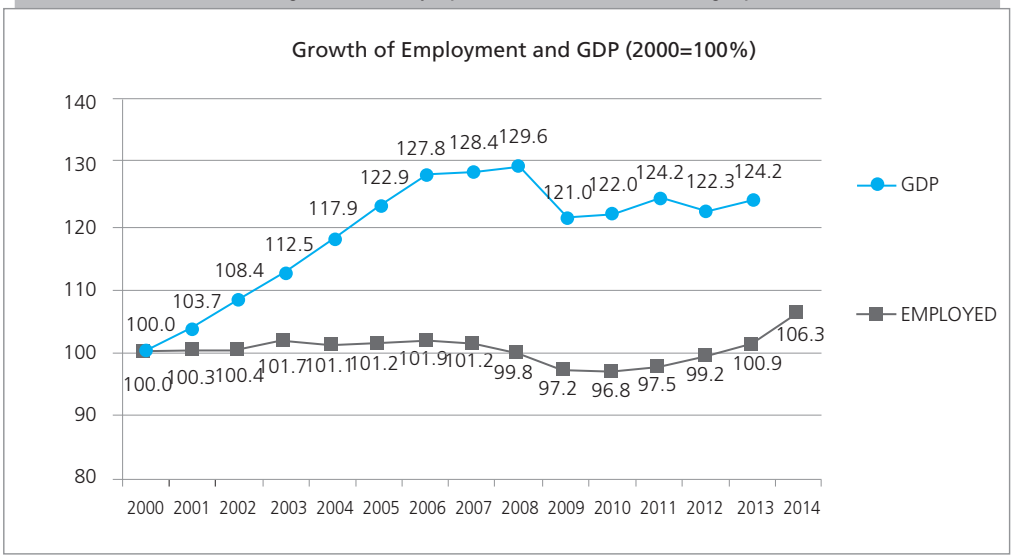
The years following the regime change saw a major economic transformation, which caused a considerable employment decline. At the very beginning of the 1990s, the Hungarian employment rate still exceeded 60% and then fell to 52% in 1996. While employment fell significantly in the first period after the regime change, the employment rate grew a bit to 57%. In 2008 and 2009, due to the world economic crisis, the employment rate began decreasing to 55.4%. Only 18% of young people (age 15–24) were employed.

In the past two decades, in line with the population's increasing average educational attainment, the proportion of those with primary educational

attainment among all employed people fell significantly, while that of people having attained secondary or tertiary education rose considerably. Over the same period, employment rates fell in all three groups, though to different extents. The importance of educational attainment is evident in the fact that while the employment rate of people with primary education did not reach 26% in 2009, the rate for those with university or college degrees was around 80%.

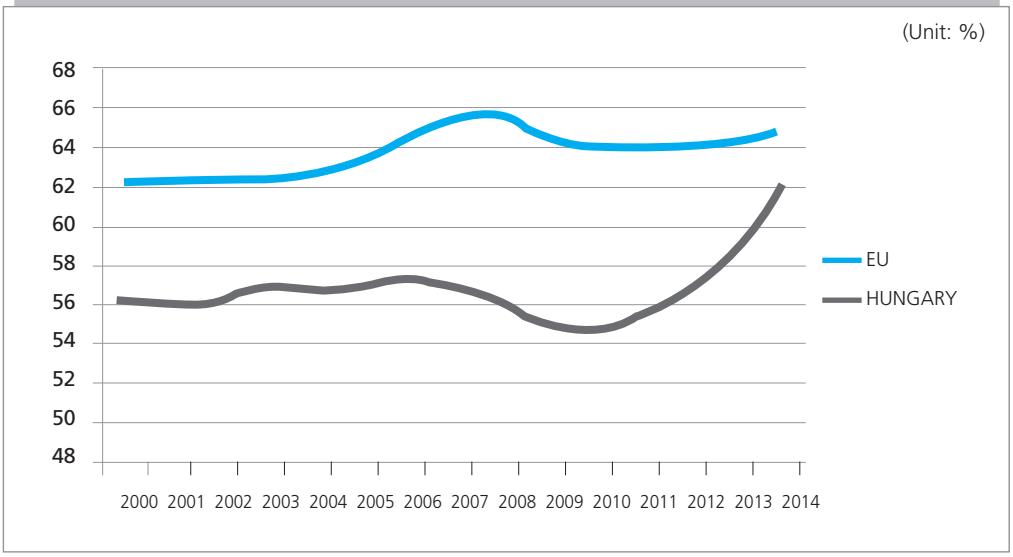
As we can see in [Figure 2-1], the GDP grew steadily in the first half of the 2000s and declined as the crisis hit. The most interesting fact regarding the connection between the GDP and employment level is that employment has shown very weak growth even when the GDP growth rate was relatively high. In other words, the productivity of the Hungarian labor force increased.

[Figure 2-1] Employment Rate Trends in Hungary



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

[Figure 2-2] Employment Rate Trends in Hungary (ages 15–64)



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

As shown in [Figure 2-2], the employment rates in Hungary have been relatively low compared to the average employment rates of the EU. Even though the employment rate has risen since 2010 and reached about 62% in 2014, it is still lower than the EU average. One of the causes of the low employment rate in Hungary can be found in its industrial structure (see <Table 2-1>). The manufacturing sector and the wholesale and retail trade sector take relatively substantial shares of employment. This structure explains the rigidity and the regional gap of the low employment rate in Hungary.

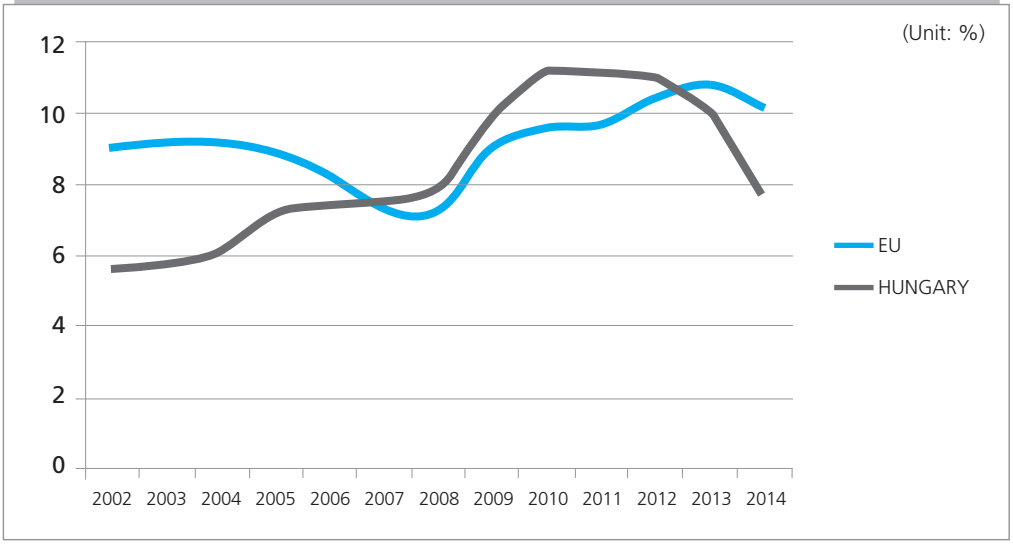
〈Table 2-1〉 Composition of Employed Persons by Sector

(Unit: %)

	2009	2010	2011	2012	2013
Agriculture, forestry, and fishing	3.5	3.4	3.8	3.9	3.6
Mining and quarrying	0.2	0.4	0.3	0.2	0.2
Manufacturing	22.7	22.3	23.0	22.4	22.5
Electricity, gas, steam, and air conditioning supply	1.2	1.1	1.1	1.0	0.9
Water supply; sewerage, waste management, and remediation activities	1.3	1.4	1.5	1.8	1.7
Construction	7.0	6.6	6.2	5.7	5.7
Wholesale and retail trade, repair of motor vehicles and motorcycles	13.6	13.6	13.6	13.2	12.9
Transportation and storage	6.9	7.1	6.9	6.9	6.9
Accommodation and food service activities	3.9	4.1	4.1	4.1	4.0
Information and communication	2.3	2.4	2.3	2.5	2.6
Financial and insurance activities	2.5	2.4	2.4	2.4	2.5
Real estate activities	0.5	0.4	0.5	0.5	0.5
Professional, scientific, and technical activities	2.8	2.9	2.6	2.6	3.0
Administrative and support service activities	3.1	3.0	3.0	3.4	3.5
Public administration and defense, compulsory social security	9.2	9.1	9.2	9.5	10.4
Education	9.4	9.4	9.2	9.0	8.8
Human health and social work activities	6.9	7.3	7.1	7.3	7.2
Arts, entertainment, and recreation	1.5	1.5	1.6	1.5	1.3
Other services	1.6	1.5	1.6	1.7	1.8
Total	100.0	100.0	100.0	100.0	100.0

Source: Fazekas & Neumann (2014).

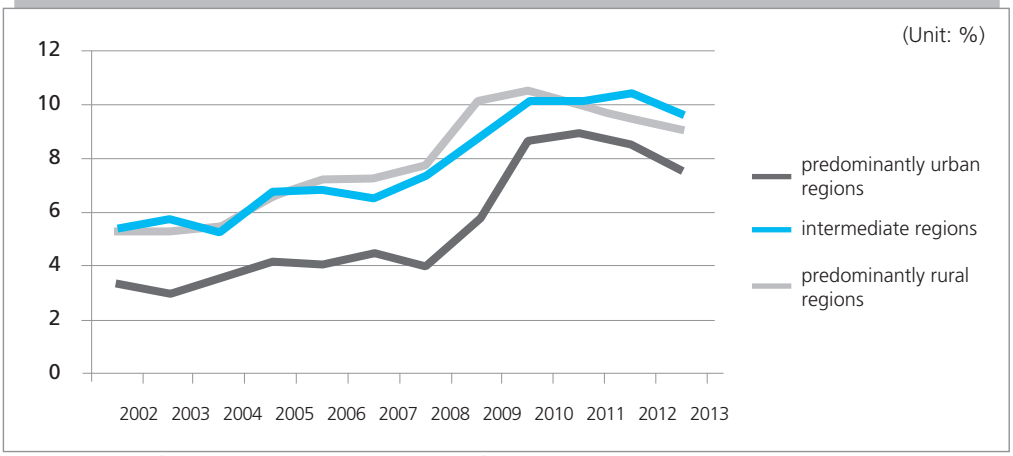
[Figure 2-3] Unemployment Rates in Hungary



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

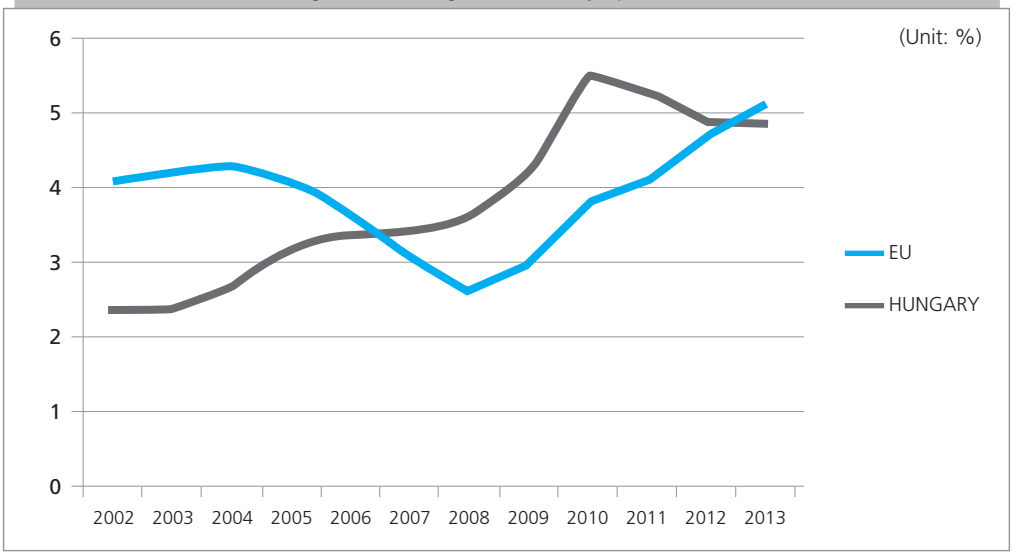
Hungary's unemployment rate remained lower than the EU average until 2007, and then it increased above the EU average unemployment rate. However, beginning in 2013, Hungary's unemployment rate started decreasing again [Figure 2-3]. The relatively low unemployment rate in Hungary can also be partly explained by the relatively low labor-participation rate. However, there are big gaps in unemployment rates among different regions. The unemployment rates in urban areas are much lower than the intermediate regions and predominantly rural regions [Figure 2-4].

[Figure 2-4] Unemployment Rates by Residential Area (age 25 years or over)



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

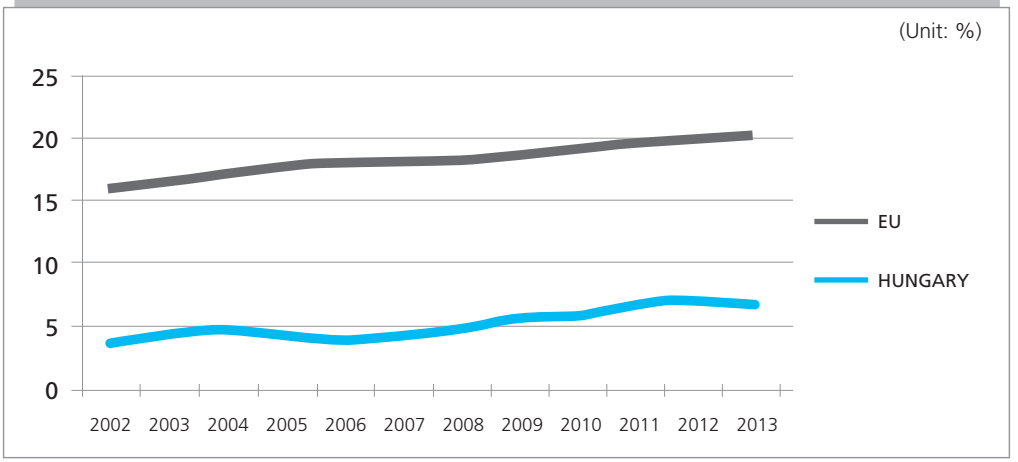
[Figure 2-5] Long-Term Unemployment Rate



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

The long-term unemployment rate in Hungary also remained lower than the EU average until 2006, at which time, it increased above the average EU long-term unemployment rate through 2012 and then started decreasing again in 2013 [Figure 2-5]. The global economic crisis in 2008 was the underlying factor in the increased unemployment rate between 2007 and 2012.

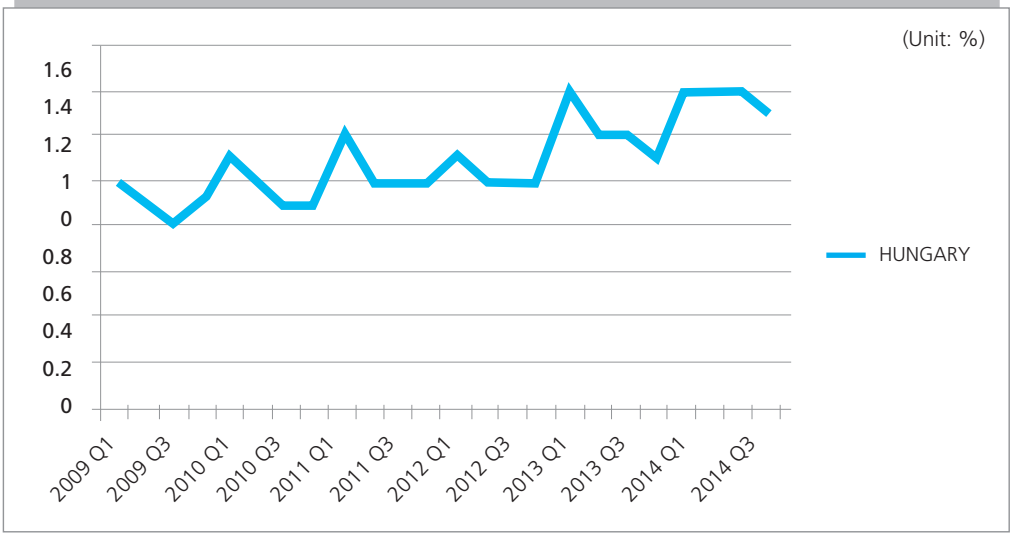
[Figure 2-6] Part-Time Workers as a Percent of Total Employment in Hungary



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

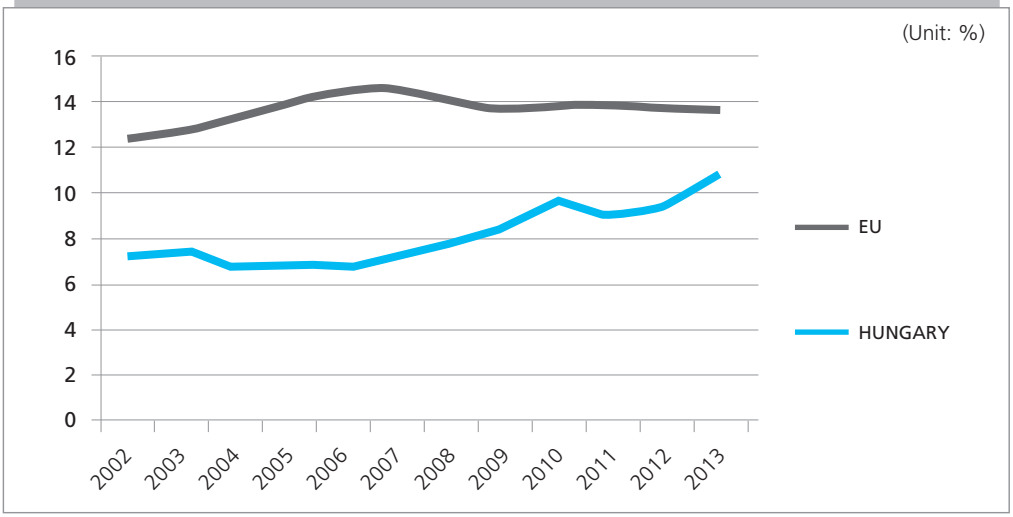
As we can see from [Figure 2-6] and [Figure 2-8], the relative rigidity of the Hungarian labor market is related to the low vacancy rate and low proportion of temporary (or part-time) employment. The percentages of employees with temporary contracts in Hungary are nearly half the EU average.

[Figure 2-7] Quarterly Percentages of Employees with Temporary Contracts



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

[Figure 2-8] Yearly Percentages of Employees with Temporary Contracts Compared with EU

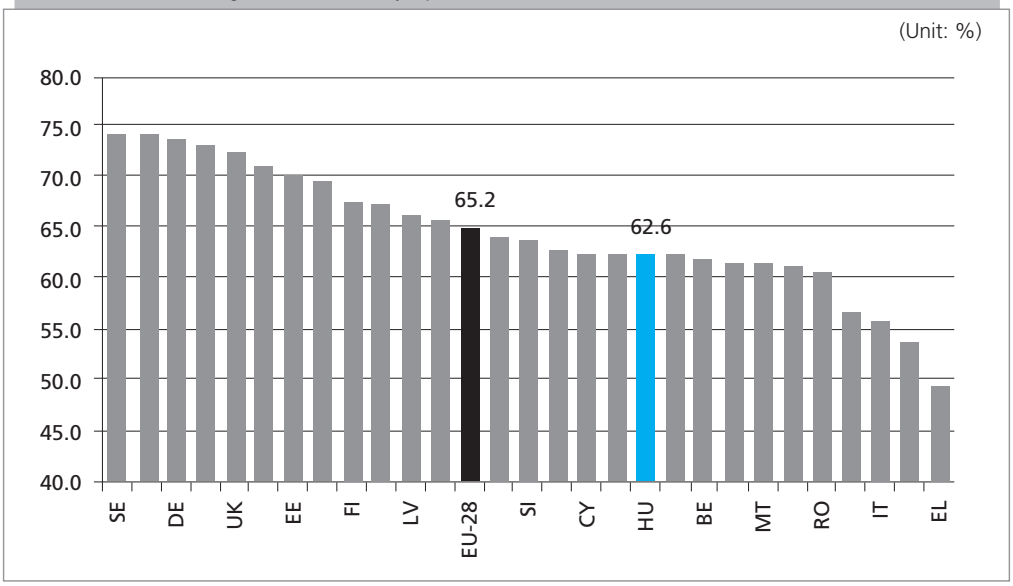


Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

2. Recent Labor Market Development in Hungary

The employment rate among the population between ages 20 and 64 has significantly increased in recent years. Because of the slightly improving European macroeconomic environments, Hungary managed to increase employment to a greater extent than the majority of the EU members, reaching 63.2% in the 20–64 age group in 2013, which exceeded the peak of 2007 (63%) prior to the outbreak of the global crisis. In the fourth quarter of 2014, the Hungarian employment rate was 62.6%, still lower than the EU average (see [Figure 2-9]).

[Figure 2-9] EU Employment Rates in the 4th Quarter of 2014



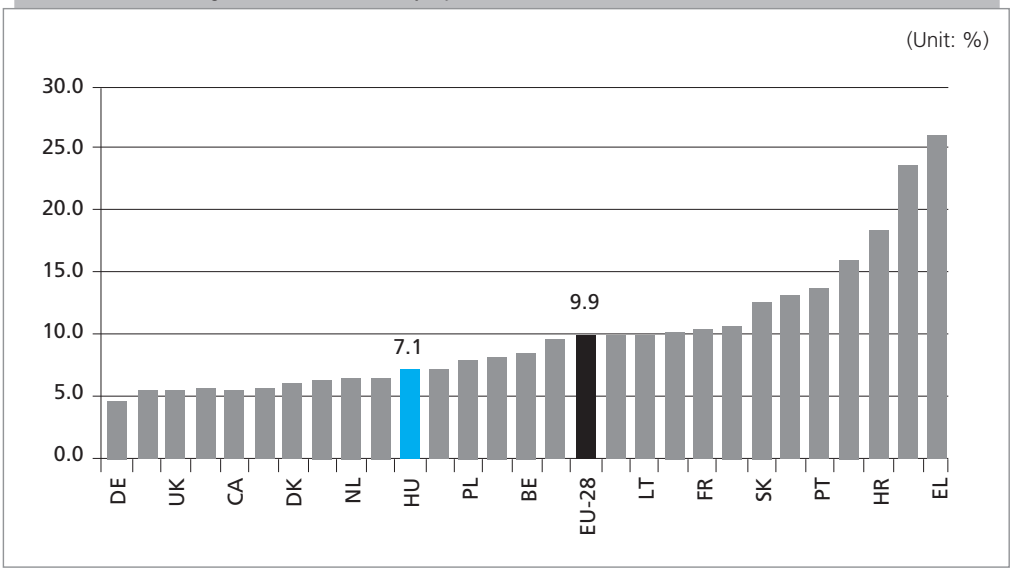
Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

Following the change of government in 2010, a significant increase in the level of employment started compared to the low levels in previous years. In 2014, the employment rate reached its highest level since the democratic transformation of Hungary in 1989. The employment expansion is due to several reasons and can be observed in different segments of the labor market. The measures that aimed to boost labor market activities between 2010 and 2013 were effective. During this period, the number of employees increased by 60,000 among public workers and by 50,000 among those employed outside of Hungary. The number of employees in the domestic, private sectors was expanded by 75,000. The increase particularly affected the atypical forms of employment, such as simplified employment or part-time employment. Between 2010 and 2013, the number of those employed through

simplified employment and part time grew by 50% and 20%, respectively. However, the recent development of employment between 2013 and 2014 is unquestionably attributed to economic growth.

The Job Protection Act offering significant tax allowances on the employment costs of specific groups contributed to the employment growth. Thus, the employment structure also improved compared to the last few years.

[Figure 2-10] EU Unemployment Rates in the 4th Quarter of 2014



Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

There was also an alarming rise in unemployment during 2009–2010—similar to the EU trends—due to the global crisis, but after the peak in 2011 (11.2%), the trend decreased to 10.2% by 2013. The annual average number of registered job seekers decreased significantly, to a greater extent compared to the previous year: in 2013, there were 528,000 job seekers, which was 30,000 fewer people compared with the previous year. The extension of the active labor market measures financed by EU funds, which were strengthened as part of the New Széchenyi Plan and within the framework of the SzéllKálmán Plan, played an important role. At the same time, there was a slight increase in the EU unemployment rate. All if these processes took place parallel to the significant increase of the participation rate: the rate of the economically active population increased from 67.9% in 2010 to 70.3% in 2013.

Solving the problem of unemployment is closely related to the Hungarian government's primary goal of economic development and social policy: to increase the labor market participation and level of employment. In the interest of the key

Europe 2020 target, for years, the Hungarian government has made significant efforts to increase the employment of disadvantaged groups. Their efforts include the following measures: induce young people to enter the job market, help the active but elderly group participate more in the labor market, make employment a more attractive option for the inactive people outside the employment market, encourage jobseekers to access support services to help improve their ability, skills, and reemployment, and help match the worker's skills to the needs of the actual labor market.

Supply- and demand-side incentives had a major impact on the labor market trends. The expansion of the labor supply was supported by government measures such as tightening unemployment benefits and altering the eligibility criteria of old-age and disability pensions by motivating the concerned groups to return to the labor market. On the demand side, extending the public work schemes fostered employment growth, while the shift in favor of flexible forms of employment facilitated by the amendments of the Labor Code and the Job Protection Action Plan supporting employers who employed the most disadvantaged groups characterized by high labor supply flexibility (persons below age 25, above age 55, the low skilled, the long-term unemployed, and mothers returning from maternity leave) also contributed to the change. Employment expansion followed the economic trend more dynamically than before due to the more extensive spread of flexible forms of employment such as part-time employment. The growth of public sector employment is attributable primarily to the public work schemes that were expanded at the end 2014.The winter public work provided temporary employment for almost 200,000 underprivileged jobseekers. The training programs promoting the preservation and development of employee skills target the reemployment of the participants in the primary labor market.

3. National Employment Service and Skill Development in Hungary

This section briefly introduces the activities and socioeconomic and public administrative surroundings of the National Employment Service (NES), Hungary's public employment service organization. We present the history, programs, tasks, financial resources, and international relations, as well as the corresponding organizational structure of this public employment service.

There are many active labor market policy interventions in Hungary that are available for the job seekers, such as the Job Protection Act, SME job creation and job retention support, and a large-scale active labor market program co-financed by the European Social Fund (ESF), among others. Among many measures, the

Hungarian government has tried to motivate more people to seek jobs actively by changing the unemployment benefit system. The major features of this effort are summarized as follows: (1) the benefit is provided for a short time, (2) there is a cooperative obligation with the PES (Public Employment Service) and its violation can lead to sanctions, and (3) the job seeker has to accept the services and programs offered by the PES and accept a job offer for suitable employment when presented.

Besides public work, training opportunity and participation in labor market programs can be offered to jobseekers. The above-mentioned employment strategies are accompanied by the possibility of receiving the remaining amount of the unemployment benefit in one lump sum in case the client finds a job before the benefit eligibility period expires. The benefit's fixed amount is 80% of the minimum old-age pension (HUF 22,800). For the period of public work, a wage is paid and the benefit payout is suspended.

Modernization of public administration: Magyary Program

To understand the employment service, we need to broaden our horizon for a moment. The National Employment Service went through a modernization process during the last few years. In order to modernize the state administration, Hungary aims to build the overall national network of government windows (one-stop shops) for easier access by citizens, which expects to be completed by December 31, 2017. A further aim is to improve cooperation between the public administration and specific social groups. In doing so, the government intends to make the operation of the state service transparent.

Legal frame of public employment service in Hungary

According to Act IV of the 1991 Job Assistance and Unemployment Benefits (Employment Act), all persons eligible for employment and all employers shall have the right of free access to the services of the National Employment Service. Labor market services, job assistance activities, public work programs, and other similar means shall accomplish the prevention, handling, and resolution of employment-related crisis situations and the prevention and reduction—as well as the mitigation of the detrimental consequences—of unemployment. The government shall supervise and control the instruments of employment for the prevention and reduction of unemployment, which will not only benefit the jobseeker(s) but also the organizational structure of the labor market. The government shall prepare and execute its employment policy and the related decisions in due observation of the overall context and consequences thereof.

Job-assistance tools

According to the Employment Act, NES has the following job-assistance tools: training assistance, promoting intensive job seeking, assistance for unemployed persons to become entrepreneurs, assistance to employers in creating new jobs, assistance with self-employment, promoting job creation and job preservation, assistance to employment of people with changed work capacity, assistance with labor market programs, and employability-improvement services. There are different kinds of employability-improvement services provided by the NES, such as job clubs where job seekers can receive counseling, the Vocational Rehabilitation Centre where people with disabilities receive support, and the Vocational and Employment Information Centre (FIT) and EUROFIT where mostly young job seekers are welcome and prepared for work, even abroad.

Financing of employment policy measures

Hungary used to have four different funds for financing the employment policy: the Employment Fund was used for active measures, the Solidarity Fund for passive measures, the Wage-Guarantee Fund for financing the wages of the employees of bankrupt firms, and the Vocational Training Fund for vocational training and education(VET). Those funds were combined into the Labor Market Fund and eventually changed to the National Employment Fund in 2010. The objectives of the National Employment Fund (NEF) are the following:

- Provide allowances to jobseekers
- Facilitate employment, create new jobs, and maintain existing jobs
- Provide support to jobseekers and facilitate their adjustments in the workforce
- Promote the social security of the employees of economic units under liquidation
- Support training system improvements
- Assist in the partial financing of benefits provided before the legal age limit in line with early retirement pension benefits
- Provide funding for the provision of subsidies and benefits financed by the allotment accounts
- Provide financial assistance for the operating costs and improvement expenses of the EURES in Hungary

The National Employment Fund shall comprise the following allotment accounts according to the appropriation of funds based on the following ground principles:

- Solidarity allotment account from which to provide job-seeker benefits, prepension job-seeker allowances, unemployment benefits, incentive benefits

provided to jobseekers, unemployment aid prior to retirement, incentive benefits provided to jobseekers, expense reimbursement, as well as postal costs in connection with the above

- Employment allotment account to provide job-assistance subsidies, labor market services that are not provided by the government employment agency, cover the costs of functions held in primary and secondary schools and arranged by the National Employment Service to provide information about the labor market and vocational and occupational guidance, and provide funding for postal costs incurred in connection with income compensation benefits
- Wage guarantee allotment account to provide funding for the provisions prescribed in Act LXVI of the 1994 Wage Guarantee Fund and for postal expenses in connection with the payment of such, training allotment account to provide funding for the tasks and programs described in the Act on Vocational Training Contributions, and assistance for the Improvement of Vocational Training Programs and the Act on Adult Education

The National Employment Fund is under the control of the Minister of National Economy. The detailed funding sources of the NEF are the following: Employers have to pay a social contribution tax, which contains health insurance, pension insurance, and the employer's contribution (solidarity contribution). This is 27% of the gross wage, but only a part of it will be channeled into the NEF (according to the Yearly Budget Act). Employers have to pay a VET contribution of 1.5% of the gross wage. The European source expenditures of the NEF are active measures and passive measures.

〈Table 2-2〉 Income and Expenditures of the Total Hungarian Budget and National Employment Fund

	Income	Expenditures
Total Hungarian budget	HUF 16,313 billion	HUF 17,190 billion
National Employment Fund	HUF 361 billion	HUF 427 billion

Source: Ministry of Economy, Hungary (2015).

The National Employment Fund consists of several sub-funds (allotment accounts). Employment policy will be covered by the so-called Employment and VET sub-Funds. In 2015, the Central Budget Act earmarked HUF 14 billion for the expenditures of that sub-fund in 2015, which is less than 5% of the NEF, but HUF 80–90 billion comes from EU sources and public work will be financed with HUF 227 billion. This money is divided into centralized and decentralized parts.

〈Table 2-3〉 National Employment Service Structure

Centralized part	Decentralized part
• Central employment, training, and labor market programs aimed at integration • Research • Job creation support • Public benefit organization support • Programs cofinanced by the EU	• Active measures/active support: training, employment support, entrepreneurship support, job preservation, and labor market programs

Source: Ministry of Economy, Hungary (2015).

4. Public Work Programs

The objective of the Hungarian government is to improve the job-creation potential of enterprises and worker employability in order to increase employment opportunities and strengthen job security.

The Public Work Scheme is a special form of employment relationship; it is supported by "transit employment," the objective of which is to facilitate successful return or access of public workers to the primary labor market. One of the basic objectives of the Public Work Scheme is to increase the employment of disadvantaged persons in the labor market, such as those with low education levels.

One of the main objectives established by the government at the beginning of 2013 was to create meaningful, useful, and value-creating job opportunities for at least 300,000 persons on a yearly basis, within the framework of public employment. Persons entitled to employment-substitute benefits are obliged to cooperate with the public employment service and to accept a job for suitable employment when presented. Public work is the most common form of cooperation. Besides public work, training opportunities and participation in labor market programs can be offered to jobseekers. For the period of public work, wages are paid, and the benefit payout is suspended. The fixed amount of the employment-substitute benefit is 80% of the minimum old-age pension (HUF 22,800).

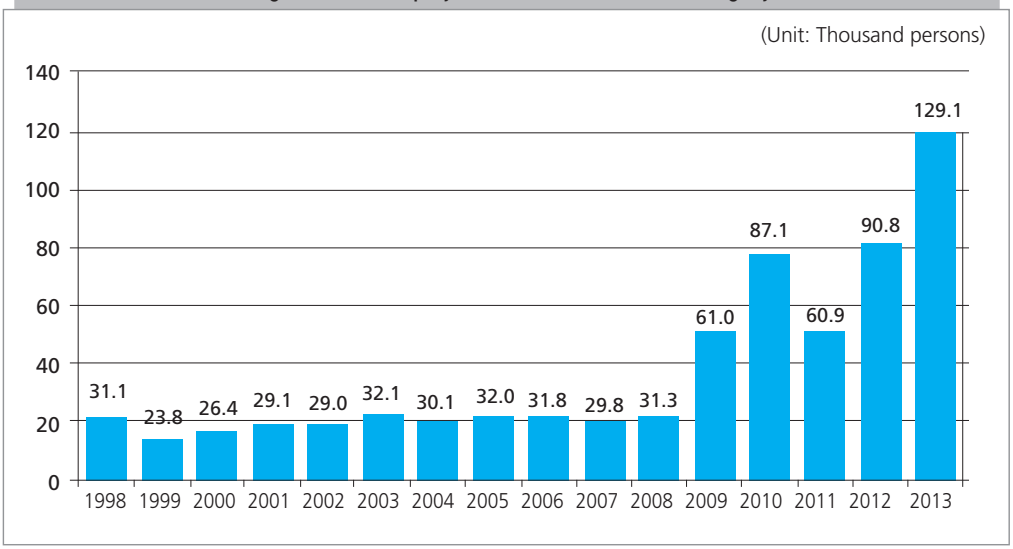
The Public Work Scheme can offer an alternative to the allowances to those who cannot find employment in the primary labor market. The main goal of the Public Work Scheme is to boost the employment and employment capacity of disadvantaged and low-qualified people.

The fact that 4.2 million people are employed presently in Hungary compared to 3.8 million in 2010 is of extreme importance. Over the past year and a half, about 8%–9% of public workers managed to find jobs in the market sector, and this ratio

is constantly increasing. The objective is that by the end of 2018 those who intend to find jobs are employed. According to the administrative data of the National Labor Office (NLO), the number of registered jobseekers was 380,200 at the end of September 2014. According to the NLO data, the monthly net number of persons in the public work program was 225,840 between September 20, 2014 and October 20, 2014.

In accordance with preliminary planning, the Start Public Work Programs for this year started March 1, 2015. The government's intention was to ensure that all jobseekers who had the capability and were ready to work were provided the opportunity, at least within the framework of public employment, to cover their own minimum needs and those of their families from income, not from aid. As a result, the average number of people involved in public employment is further increasing and it is expected to reach 220,000.

[Figure 2-11] Employment in Public Work in Hungary



Source: Ministry of Economy, Hungary (2015).

Training in the frame of public work programs

The training programs implemented within the framework of public employment provide greater opportunities for future employees to acquire the skills necessary to find jobs in the competitive sector or for self-employment. Special attention is paid to training of the most disadvantaged people; therefore, a specific training branch was initiated in 2013 in the most disadvantaged small regions. All of these OKJ(National Qualifications Register) trainings are based on the labor

market demands of local public and market employers, for such occupations as cheese makers, workers at animal farms, health development assistants, cleaning-technology-skilled workers, shoemakers, etc.

Because of the high ratio of people with multiple disadvantages, i.e., without professional qualifications and with low education levels, the training related to the winter public employment was implemented mainly in the form of basic competency building and remedial training.

Finding jobs to replace public work is continuously measured by examining administrative databases (e.g., the National Tax and Customs Authority, which has information about the insured people who are employed, and the National Employment Service, which has information about the registered people looking for jobs). The data are evaluated with data warehouse output. One of the key figures is from the examination of the labor market status on the 180th day following the end of the public work. Based on that, in 2012, 51.1% of people leaving public employment worked on the examined day, and in 2013, it was 60.9%. Within that figure, 11.6% worked in the primary labor market, while in 2013 this ratio was even better, 13%.

The resources for the implementation of the public employment training programs were ensured by the SROP "I learn again!" priority project for which the project budget was increased by HUF 24 billion. HUF 3.2 billion of the HUF 24 billion appropriation was earmarked for professional implementation expenditures (labor costs, IT tools, paper and office supplies, postage, etc.), and HUF 20.8 billion for target group support, providing the opportunity to train 100,000 persons.

The main training by the NES provides the following skills: (1) professional skills that may also be used in the open labor market, (2) knowledge related to renewable energy sources, (3) skills from the so-called "jack-of-all-trades" training that may be used in social cooperatives, and (4) remedial programs assisting independent living solutions.

With the purpose to serve the growth of the Hungarian economy from 2014 to 2020, Economic Development and Innovation Operative Programme (EDIOP), the "competitive labor force" priority axis, supports the labor supply development by assisting with competency development and training for adults, on the one hand, and by developing the training system in a way that it is adjusted to the needs of the economy, on the other hand. The purposes of this program are the following: better adjustment of the short- and long-term labor supply, assist with satisfying the economy's labor demand, and contribute to improving competitiveness. Special attention must be given to people with low education levels who should

be provided the opportunity for training, whereby their chances for access to the open labor market increase. The Ministry for National Economy prepared the amendment of the Employment Act, which, similar to the jobseekers without a public employment relationship, makes it obligatory for the people in public employment to accept a job offer deemed acceptable by the above Act. Any violation of the jobseeker's obligation to accept a suitable job shall not only entail deletion from the job-seeker registry but also exclusion from public employment.

[Box 2-1] Financing of VET and Adult Learning in Hungary

In Hungary, adult education (and training) is regarded as an important activity. The law defines this activity as education and training provided outside the school system on a regular basis. It includes language or vocational training and services related to adult training performed in institutes, of any level, but targeted to obtain certain competencies.

Every ministry is indirectly involved in the financing of training, but the direct funding comes from the Ministry for National Economy. The Ministry for National Economy presently deals with finance, employment policy, vocational education and training, domestic and foreign trade, etc.

However, in a narrow sense, what we mean by adult education and training, that is, the bulk of activities, services, and performance, are the primary responsibility of the Ministry for National Economy, where documents, decrees, and acts are prepared and modified and relevant programs are designed, giving rise to communication and international cooperation.

Probably the most characteristic change in the funding of adult learning (hereinafter, ALE) in the last 11 years is the emergence of EU funding and its gradual increase, especially in the last third of this period. Another important feature is that the number of adults enrolled in education and training increased until the end of 2011. Around 2006—because of the budget cuts—normative subsidies for ALE and personal income tax allowances ceased, and this worsened even more in 2012. The possibility for setting the employees' educational and training costs against the VET contribution tax also ceased. (As we shall see later, some of the achieved benefits—probably according to the improved budget balance—were reestablished.)

According to the VET and ALE report that the Department of the Ministry for National Economy submitted to the OECD, we can summarize the current situation as follows:

- The number of adults enrolled in ALE unambiguously increased between 2009 and 2011.
- In the long term, the entire ALE as a sub-sector of the economy will probably stagnate.
- Between 2006 and 2010, the financial governance simultaneously reduced certain items (personal income tax allowances, normative subsidies for ALE) and increased other items (EU funding and consequently their national contribution)—all in close connection with the recession of the world economy.
- ALE's local funding resources will lessen in the long term.
- The development levels will stagnate or slowly increase.
- For the educational sector as a whole, implementing the reform elements that serve higher levels of efficiency and quality has been accelerated.

There are several different types of funding measures to support Hungarian companies'

training activities. First, training subsidies make up one group of financing schemes in VET/ALE. Subsidies for practical training are the first type of subsidy. The aim of this support is to encourage the practical training of secondary school pupils in companies. The target groups of this funding scheme are companies paying the obligatory vocational training contribution. Different calculation methods are applied to the different vocations: e.g., multiply the basic normative (defined in the annual Hungarian State Budget Law as EUR 1500/pupil/year) by the factor defined for a certain vocation (multiplier between 0.7 and 2.1). The vocation factors (multipliers) are defined in Government Decree No. 280/2011 (XII. 20.)

Meanwhile, the core criteria for allocation are to (1) sign apprenticeship contracts with pupils (countersigned by the chamber concerned) or an agreement of cooperation with a secondary school or contracts with students of higher vocational education,(2) guarantee the allowance to pupils in line with the relevant law,(3)compile the education program of the on-the-job (practical) training, and(4) keep a log of the practical training, labor safety, and attendance.

The second type of scheme is "deduction of earnings before taxes." The aim and target group are identical to those of subsidies for practical training. This subsidy is a tax allowance. As for its extent, the earnings before taxes can be reduced by 24% of the minimum wage (applicable in Hungary) every month for each secondary school pupil. The core criteria for eligibility are to (1) sign apprenticeship contracts with pupils (countersigned by the chamber concerned) or agreement of cooperation with a secondary school or contracts with students of higher vocational education, (2) guarantee the allowance to pupils in line with the relevant law, (3) compile the education program of the on-the-job (practical) training, and (4) keep a log of the practical training, labor safety, and attendance.

The third type of scheme is "subsidies for own employees' training." The aim of this subsidy is to support training of the company's own employees. The target group contains companies that provide practical training. The subsidy amount is a maximum of 16.5% of the gross VET contribution. The main criteria are as follows: (1) minimum of 45 apprentices, (2) training provided according to the 2013 Adult Learning Act, (3) training not in the form of distance training, (4) minimum length of the training is 20 hours; training venue is within the territory of the European Union, and the companies receiving this subsidy must provide data on the training.

The Minister for National Economy decides on the second biggest group of subsidies. Two types of schemes exist within this category: (1)training subsidies and(2)aid for workshop establishment and development.

Eligibility for the training subsidy is as follows: (1) a minimum of 50 newly created jobs, (2) an investor's seat or branch office in Hungary, (3) a letter of intent or application form to be submitted before the start of the training project, (4) 18-month full-time employment of at least 70% of the trained employees after the training, (5) trainees must be directly employed by the investor, (6) the training organizer must have permission for adult training when the training takes place in Hungary; (7) in case the investor resorts to any kind of regional subsidy, the trainings essential to the commencement and the operation of the investment cannot be supported, (8) trainings considered to be obligatory to the investor according to the Hungarian law cannot be subsidized, and (9) the number of employees who participate in the trainings cannot exceed the number of new employees (however, the participants do not have to be newly employed).

Aid amount: Maximum of EUR 0.5 M (HUF 155 M) if the number of trainees is between 50 and 250

Maximum of EUR 1 M (HUF 310 M) if the number of trainees is between 251 and 500

Maximum of EUR 1.5 M (HUF 465 M) if the number of trainees is between 501 and 750

Maximum of EUR 2 M (HUF 620 M) if the number of trainees is >750

However, the subsidy per capita cannot exceed EUR 3,000. This subsidy is granted in all regions of Hungary, and it is above the maximum intensity ratio fixed by the European Union. Generally, the intensity rate of the training subsidy cannot be more than 50% of the eligible costs. However, the above intensity rate shall be increased by
10% if the training is given to disadvantaged workers,

10% in the case of medium enterprises, and

20% in the case of small enterprises;

however, it cannot be more than 70% of eligible costs.

As for the aid for workshop establishment and development, the eligibility criteria are as follows: (1) an investor's seat or branch office in Hungary, (2) large enterprise, (3) increase of 50 students with a contract, (4)the created positions must be maintained for at least five consecutive years,(5) turnover of the beneficiary companies in the previous two business years will occur if they experience at least four times a reduction of the vocational training contribution calculated based on the students with apprenticeship contracts, (6) letter of intent or application form to be submitted before the start of the project, (7) use of the established workshop for practical aims for five school years, and (8) expenditure of revenue from the use of the established workshop for practical training.

Aid amount: a maximum of EUR 8,000 per student with a contract; however, the total subsidy amount cannot exceed EUR 2 million. The number of students refers to students as well those who are employed at the time of the submission of the application for the subsidy and will be trained in the established workshop. This subsidy is granted in all regions of Hungary, and it is above the maximum intensity ratio fixed by the European Union.

Aid intensity: a maximum of 73% of the eligible costs. Eligible costs of the subsidy: building costs and asset acquisition costs of the workshop defined in the relevant annex of the decree.

The application may be realized by a one-step or two-step procedure as follows.

Two-step procedure: A letter of intent containing the main project parameters shall be submitted to the Ministry for National Economy, and the application form shall be submitted to the Ministry for National Economy during the year following the acceptance of the confirmation letter of the Minister for National Economy.

One-step procedure: Submission of the application form to the Ministry for National Economy.

System and financing of VET in Hungary

A challenge for the Hungarian government is the considerable lack of qualified workforce at the level of VET graduates, or, in other words, qualified labor. This is due to both demographic and structural reasons. While in the 1990s, 170,000 young people obtained

ISCED level 2 qualification (általánosiskola, ending at the age of 14/15 in Hungary), but in 2014, the number decreased to only 120,000. This means a 50,000 decrease in the student population. This decrease is most noticeable in vocational education and training.

What also worsens the situation is the high number of retired people: 50,000 in the upcoming years. These employees are mostly working in VET professions of high labor-market demand. Meanwhile, 60% of those registered as unemployed do not have a qualification. Overall, the challenge is considerable and needs strong and immediate intervention.

The Hungarian government's response to the above challenges is clarified in the policy paper "VET for Economy" approved by the government in February 2015. The policy initiatives drawn up in this paper will lead and drive VET developments in the coming years.

The two main elements of this concept are (1) developing and enhancing the apprenticeship scheme and (2) enhancing the institutional structure and the training to be offered.

As already mentioned, the Hungarian government pays close attention to improving its policy initiatives for vocational education and training. The overall policy target is to enhance VET provision in order to ensure labor market matching and to provide a qualified workforce for labor market demand. In order to reach this goal, many policy initiatives have been taken and will be initiated in the near future. One initiative supports apprenticeships, which is also in line with the European Commission's policy and receives large support and high attention from the Hungarian policy stakeholders.

In order to strengthen dual VET, or, in other words, the apprenticeship scheme, the government aims to extend the number of apprenticeship contracts from the present 50,000 to 70,000 by 2018. Presently, there are 8,000 companies involved in dual VET. This should increase to 20,000. One initiative to reach this target is called "Guarantee by the Chamber." The Hungarian Chamber of Commerce and Industry works as the government's key partner and plays a large role in the development of the dual VET system. One of its roles is to negotiate and convince companies to take up apprentices. As of summer 2015, by rule, all VET students are to accomplish their practical training as apprentices at companies. The Chamber provides this guarantee so that all students can find placements. Only when reasonable and identifiable reasons exist may the student accomplish his/her practical training in the school workshop.

Beginning September 2015, the governance of 300 VET institutions will move from the present Klebelsberg Institution Maintenance Centre to the Ministry for National Economy. Parallel to this, the government established the National Office of Vocational Education and Training and Adult Learning. The Office will organize vocational centers at the county level as well as in the capital. This governance model should provide greater autonomy at the regional level to ensure participation. The centers will provide space and infrastructure for adult learning and VET for adults (CVET, continuing vocational education and training), contributing to the policy aim to extend participation in lifelong learning in Hungary.
In the 2016/17 school year, vocational secondary schools (szakközépiskola providing a Secondary School Leaving Certificate like the general upper secondary schools) are to be modified into szakgimnázium. In these new types of institutions, VET students will obtain the Secondary School Leaving Certificate (maturity exam), and beyond that, with one extra year of schooling, a VET Technician Qualification as well.

The present VET schools (szakiskola) will be modified into vocational secondary schools (szakközépiskola). These students will have the possibility, having completed their three-year

VET studies, to continue their studies for an extra two years in general subjects and pass the Secondary School Leaving Examination.

5. New Directions of Hungarian Labor Market Initiatives

The Hungarian government's primary employment policy aim is to create more private sector workplaces and encourage companies to provide jobs for an increasing number of employees with or without subsidies. The call for applications for the maintenance of jobs and job creation was launched in 2014, financed by the National Employment Fund with a budget of HUF 26 billion. The government considers the creation of jobs a priority; therefore, it aims to spend a significant part—60% of the European Structural and Investment Funds provided for 2014–2020. The objectives include developing enterprise competitiveness, creating new workplaces, developing workforce competitiveness, enhancing innovation capacity, and focusing on developing the industrial and service sectors. The government focuses on subsidizing the creation and maintenance of workplaces in deprived areas, encouraging investments implemented by enterprises, and increasing employment of registered job seekers in the newly created workplaces. By means of the above, the local economy will be stronger.

The task of the employment policy is to provide temporary employment for the long-term unemployed or inactive, including those with low education levels and those living in areas lacking jobs—primarily in the eastern and northern regions—until the job creation starts in the enterprises. Lately, the measures taken by the government aim to offer jobs instead of giving aid, even in the short run.

The government enhanced the instruments helping to move from public work to the open labor market. On the one hand, the activating element of public work grew stronger with the large-scale training program for public workers, where the public workers' competencies and skills were developed. On the other hand, the social cooperative was developed, which provides temporary employment of the unemployed relying on local opportunities, partly from state subsidies and partly from its own revenue; its aim is to transfer those participating in the program to the open labor market in the long run. In 2013, the scheme for the development of social cooperative co-funded by the ESF was launched. This project will be implemented before June 2015 with a budget of HUF 15 billion. This measure helps financial sustainability and the strengthening of social enterprises and improves the employability of the deprived.

Hungary has strengthened the active labor market measures by promoting employment for the unemployed and the inactive. As a result, more than 205,000 people on average per month participated in the active measures in 2013, which is a 37% increase compared to the previous year (about 150,000 people). Because of the restructuring of unemployment benefits and the activation measures, the number of registered jobseekers went down from 527,624 (2013) to 398,643 (2014 Q3). The average monthly number of participants in active measures (without public work) went up to 84,100 in 2013, a 189% increase compared to 2011. Because of the increase in participation in active measures and due to the decrease of the number of registered jobseekers, the activation rate went up from 17.1% (2011) to 28% in 2013 <Table 2-4>.

〈Table 2-4〉 Changes in Hungarian Labor Markets

(Unit: Number of people)

	Participants in active labor market measures		
Year	2011	2012	2013
Average monthly number of participants in active measures	120,297	149,760	205,471
From this: average monthly number of public workers	75,810	92,142	121,367
Average number of jobseekers	582,868	559,102	527,624
Activation rate (%)	17.1	21.1	28.0

Source: Ministry of Economy, Hungary (2015).

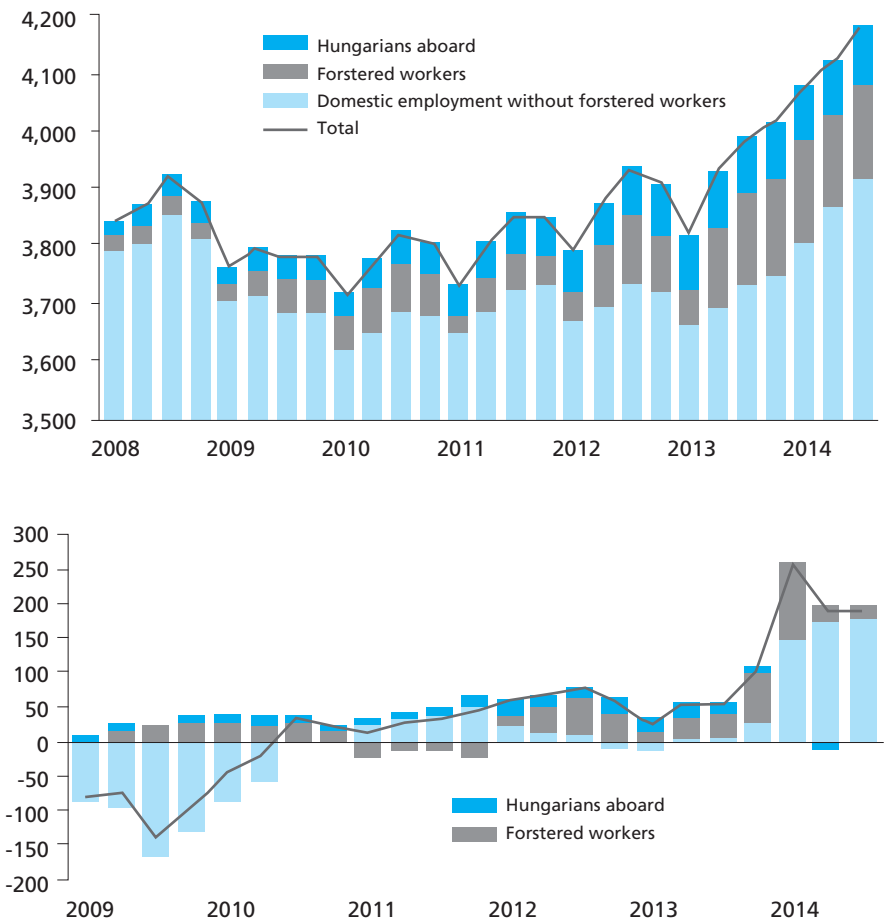
In the 2014–2020 periods, active labor market programs will comprise more than 78% of the budget (~EUR 1.3 billion) for priority axis "employment" in the economic development. Within this ratio, 40% is dedicated to measures under the Youth Guarantee (active labor market measures fostering youth entrepreneurship and apprenticeship programs), while more than 38% constitutes large-scale active labor market programs to improve the employability of disadvantaged jobseekers over age 25.

In October 2014, proposals for two programs aimed at youth were submitted. The first was a large-scale active labor market program delivered by Public Employment Service (PES) with a budget of EUR 133 million targeting at least 40,000 young people. The second proposal promoted youth entrepreneurship with a budget of EUR 13 million and aimed to train at least 1,600 young people, among whom 965 will start enterprises.

During the past few years, the Hungarian government introduced a number of measures to mobilize the labor force: the long-term reforms of the labor market's supply side brought social service system reform, strengthened the active labor market instruments, introduced a new public work program, adopted a new labor code, and transformed the labor income tax system. All of these measures were complemented on the demand side. The new tax system and employer benefit system affected hundreds of thousands of people and directly reduced employment costs. By restructuring vocational and adult training and introducing dual elements of vocational training, the government has taken significant steps to bridge the gap between labor supply and demand.

[Figure 2-12] Composition of Employment Growth by Main Sectors

(Unit: Thousand persons)



Source: Hungarian Central Statistical Office.

For instance, recent Hungarian economic growth boosted the job-creation capacity of the private sector. As we can see in [Figure 2-12], the largest expansion of employment happened in the private sectors beginning in 2012. The employment growth reached a greater level in the disadvantaged regions (except southern Transdanubia). The eastern part of the country shows dynamic employment growth, which exceeds the country average <Table 2-5>.

〈Table 2-5〉 Recent Changes in Hungary's Regional Employment

Changes in the number of employed compared to same period of previous year

(Unit: %)

	2014 QI	2014 QII
Central-Hungary	103.8	104.4
Central-Transdanubla	104.7	105.8
Western-Transdanubla	108.1	106.0
Southern-Transdanubla	108.0	103.0
N0rden-Hungary	111.9	106.5
Norden-Great Plaln	112.6	104.7
Southern-Great Plaln	104.8	104.3
Total	106.8	104.8

Source: Hungarian Central Statistical Office.

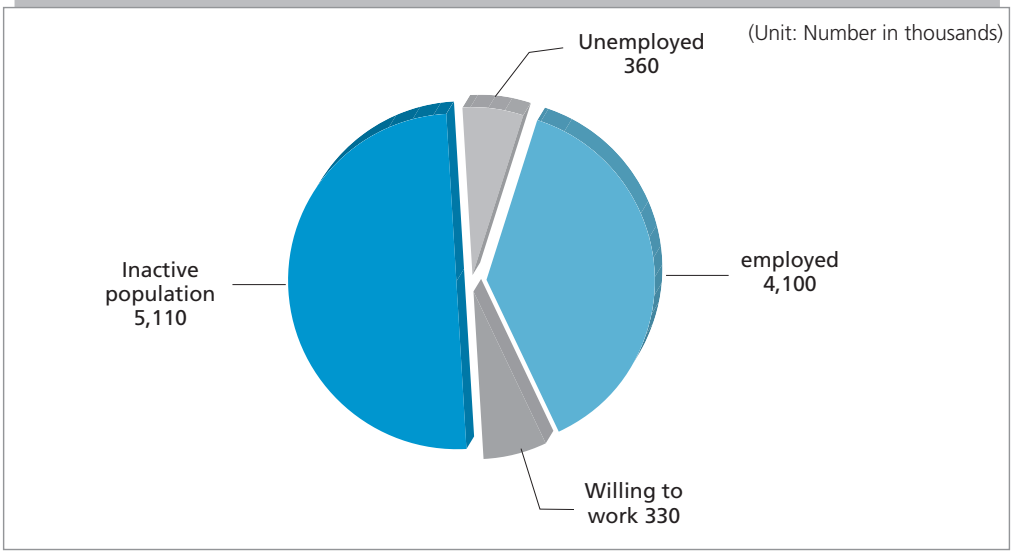
6. Recent Challenges in Hungarian Labor Markets

Despite the recent employment expansion, the Hungarian labor market still faces serious challenges. First, labor force inactivity is the foremost problem. Figure 2-13 shows the 2014 Hungarian labor force structure of the population between ages 20 and 64. More than the half the population in this age group is still inactive.

Second, Hungary's youth unemployment rate is still considerably high and has increased constantly. Since 2005, it has been higher than the EU average. Considering that the youth unemployment rate usually doubles the overall unemployment rate in most EU countries and other countries, Hungary's youth unemployment rate is quite serious. In Hungary, it was possible to tackle the situation with targeted measures. The country still considers youth unemployment a top priority and an important challenge. "First Job Guarantee" was launched in 2012, and from the beginning of 2013, the targeted allowances of the Job Protection Action Plan also helped young job seekers find their first jobs. Several

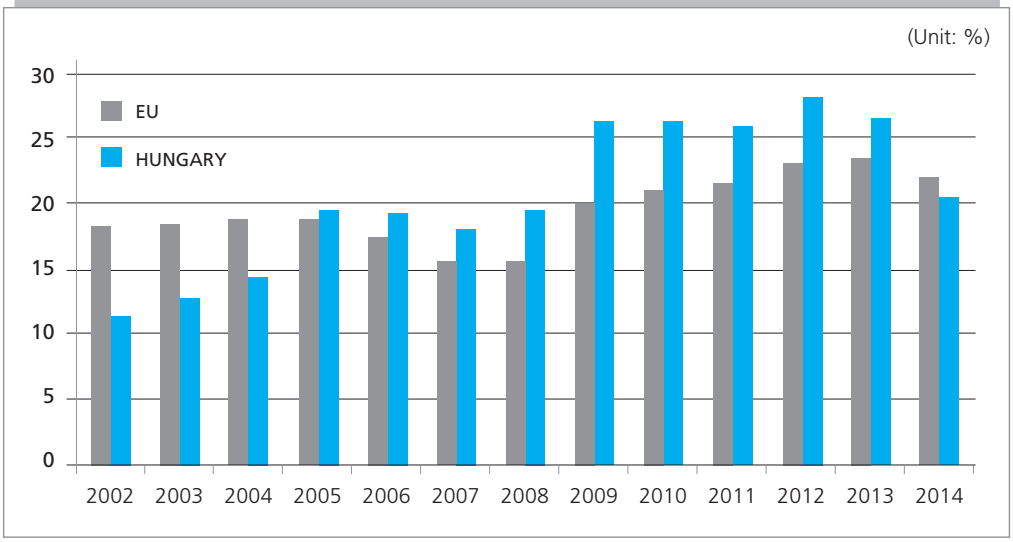
EU cofinanced programs (like Youth Guarantee) aim to help youth employment by providing apprentice programs for gaining experience, active labor market measures that improve employability and focus on youth, programs that support youth in becoming entrepreneurs, and measures aimed to strengthen skills and provide career guidance.

[Figure 2-13] Labor Force Structure of the Population between Ages 20 and 64 in Hungary in 2014



Source: The Ministry of Economy, Hungary.

[Figure 2-14] Youth Unemployment Rate, Ages 15–24

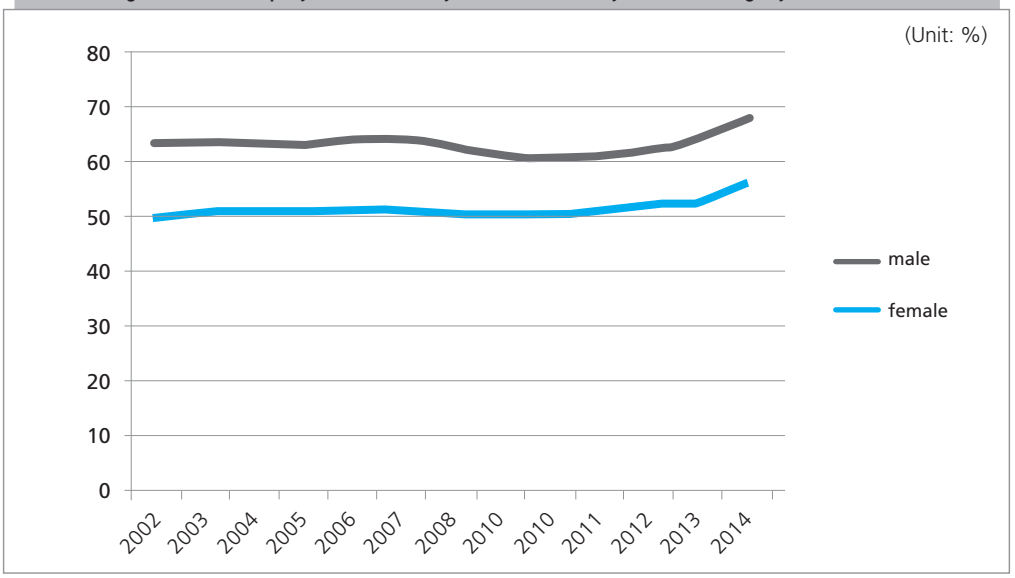


Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

Third, the gender employment gap between the EU and Hungary is also significant. The gender employment gap in Hungary is historically high and has been more than 10% since 2002. The participation level in the women's labor market has been rising constantly, in line with favorable labor market trends in the last three years, reaching 57% in the 20–64 age group in 2013, which is a 0.6% increase compared to 2012 (2012, 56.4%; 2010–2012, +1.4%), the highest level for decades. For comparison, the index rose slightly on average in the 28 EU member states until the end of 2012 (2012, 62.3%; 2010–2012, +0.3%).

In summary, the Hungarian labor market is characterized by a low labor force participation rate and a low employment rate, which signifies a malfunctioning labor market and ineffective labor market policies. While there could be several ways to revitalize the Hungarian labor market, we will focus on the public employment service and vocational training policies in Hungary. Among the labor market policies, public employment service and training programs are the most emphasized active labor market measures to improve employability in OECD countries, because many labor market programs are administered by the public employment service (OECD, 2015).

[Figure 2-15] Employment Rates by Gender (15–64 years) in Hungary (2002–2014)



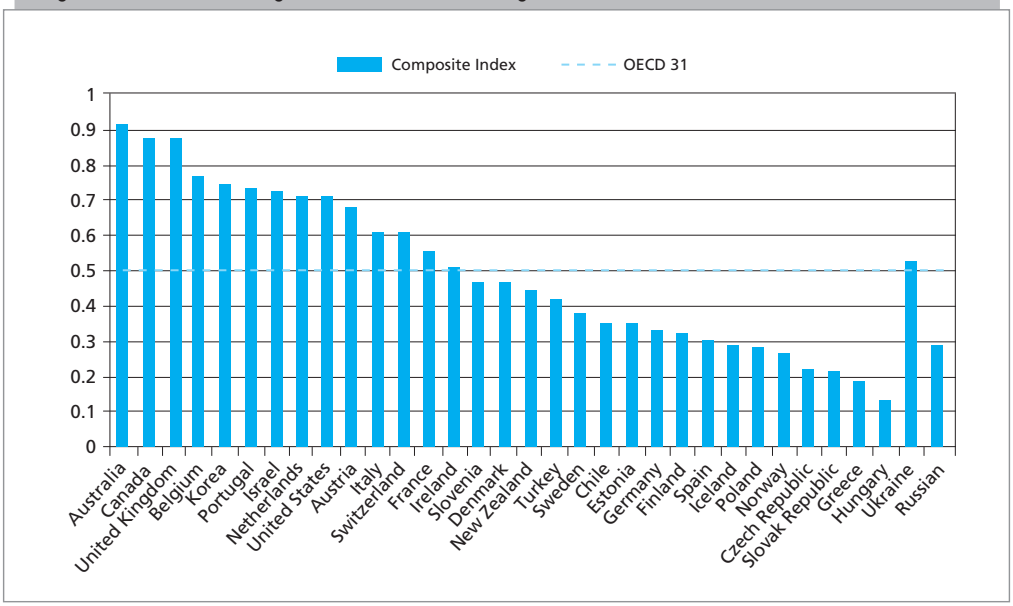
Source: Eurostat (http://appsso.eurostat.ec.europa.eu).

The Hungarian government also places increasing priority on measures to enhance the effectiveness of public employment service and skill-development programs to increase the employability of its inactive labor force. The Hungarian government recognized that the establishment of a well-functioning PES is

essential to its successful human resource management and started setting up the institutional infrastructure for these services and has made much progress lately. However, the actual services need further development to reach their full capacity.

Figure 2-16 shows the strategic human resource management situations in OECD countries. Strategic human resource management allows governments to align their workforce with their goals. It enables governments to "have the right number of people with the right skills at the right place" (Kroll, 2002). Such practices help governments increase efficiency, responsiveness, and quality in service delivery. A sample of OECD work on strategic workforce management reveals the extent to which governments use performance assessments, capacity reviews, and other tools to engage in and promote strategic workforce planning (OECD, 2010). Among 31 OECD countries, Korea's index is above 0.7 and similar to the UK and Belgium, which means Korea's strategic human resource management is relatively effective, while Hungary's index is a little above 0.1, and it is the lowest among 31 OECD countries (OECD, 2010).[21)]

[Figure 2-16] Use of Strategic Human Resource Management Practices in the Central Government (2010)



Source: OECD (2010).

21) The recent composite index for Hungary must be higher than that of 2010 shown in the figure, since the Hungarian government has been implementing several active labor market measures.

In order to help the Hungarian government's efforts to improve its effectiveness of strategic human resource management, we will look at the Korean public employment service and skill-development programs to draw policy implications for Hungary. Like many other developing countries, Korean programs in public employment and training did not fully evolve during its high economic growth period. It was the Asian financial crisis in the late 1990s when the Korean government started placing increased priority on these labor market measures along with the other active labor market programs to deal with imminent massive unemployment resulting from the crisis.

7. Korean Public Employment Service

In order to help the Hungarian government's efforts to improve its effectiveness of strategic human resource management, we will look at the Korean public employment service and skill-development programs to draw policy implications for Hungary. Like many other developing countries, Korean programs in public employment and training did not fully evolve during its high economic growth period. It was the Asian financial crisis in the late 1990s when the Korean government started placing increased priority on these labor market measures along with the other active labor market programs to deal with imminent massive unemployment resulting from the crisis.[22)]

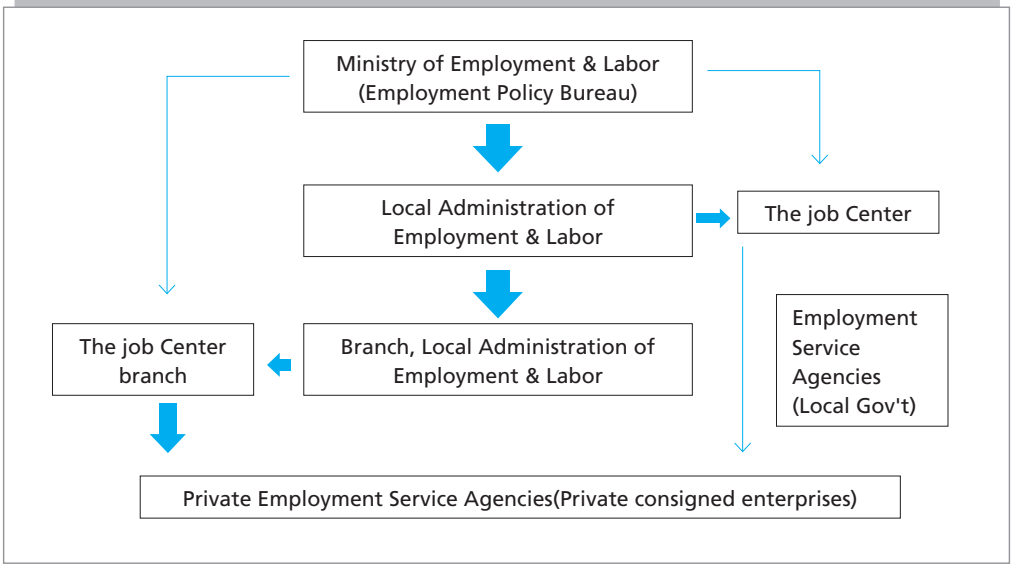
Korean PES system developed several innovative programs and instruments, most representative, the one-stop-service delivery system, the interlinkages between employment assistance and unemployment benefits accompanied by vocational training, and a successful employment package program. Since the late 1990s, there were several reforms and reorganizations in the PES programs. As a result, the one-stop delivery system that provides unemployment benefits, assistance in job placement, vocational skill development, and employment security was set up. The interlinkages between the programs were well established, which enabled the delivery system to work more efficiently. The effectiveness of the service was also improved by developing a network among local governments, local business associations, labor unions, and vocational training agencies (Oh *et al.,* 2013).

The current Korean PES delivery system structure is shown in [Figure 2-17]. The main agency carrying out PES now is the Job Center. In addition, local governments provide PES through their employment service agencies. Private employment service agencies have been very active as well, in cooperation with the Job Center and

22) See Box 2-4 for information about the EIS.

under its supervision.

[Figure 2-17] PES Delivery System in Korea



Source: KEIS (2012).

The number of private offices in Korea is four times as many as the number of public offices <Table 2-6>. Private employment services played very important roles during the crisis. However, the office network of the Ministry of Labor as well as municipalities has expanded significantly: the number of PES offices increased by 173% from 52 to 142, and the PES workforce more than tripled during the crisis, while the number of private employment offices increased modestly.

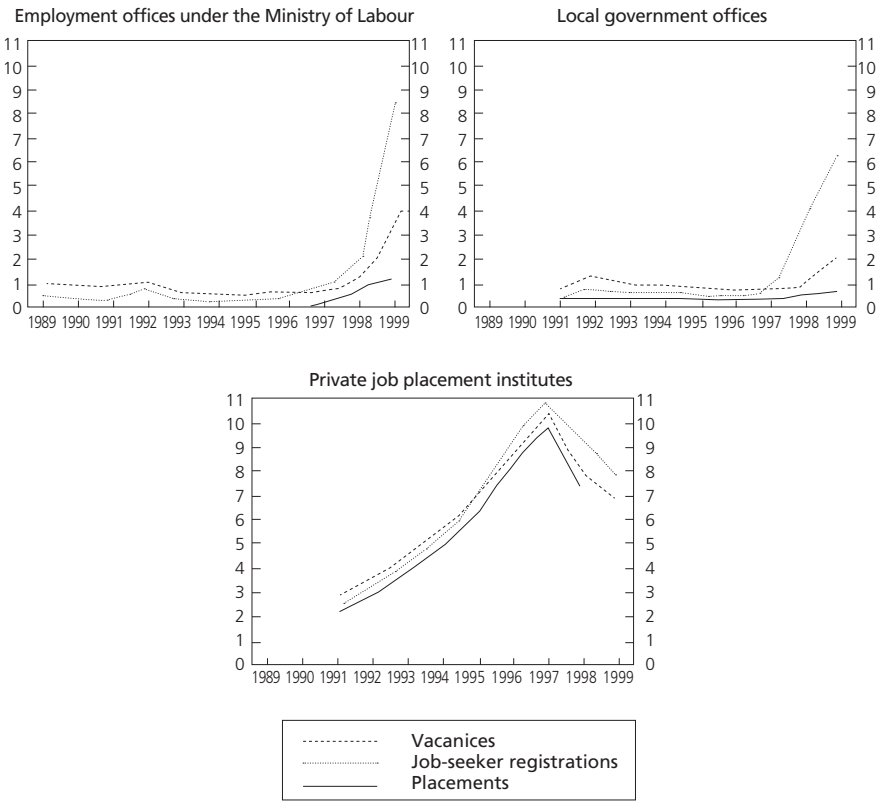
〈Table 2-6〉 Public and Private Employment Offices

	Ministry of Labor offices		Local government offices		Private employment offices	
	1995 (before the crisis)	1999 (a) (after the crisis)	1995 (before the crisis)	1999 (a) (after the crisis)	1995 (before the crisis)	1999 (a) (after the crisis)
Offices	52	142	285	285	1,271	1,756
Staff	1,000	3,200	360	*	3,500	*

Note: Data not available
Source: Ministry of Labor (2002).

The number of registered jobseekers and annual placement rates indicate that private agencies have higher market penetration than the public employment service. The rate of vacancies reported to public offices was below 2% of the labor force before the 1997 crisis. After that, the public employment service expanded, and, accordingly, the rate significantly increased. Notably, the nature of vacancies at private and public agencies is quite different. Private agencies are known for placing a large number of low-skilled workers, while the placements by the public employment service tend to be of longer duration (Ministry of Labor, 2002).

[Figure 2-18] Performance of Employment Services in Korea (1989 to 1999): Annual Flows as a Percent of Total Labor Force



Source: OECD(2000).

Between 1998 and 1999, right after the economic crisis, the ministry's offices filled almost 50% of the job vacancies. The share of vacancies reported to the public employment service increased from 3% in 1995 to 13% in total hiring in 1998. The market share of the public employment service, however, remains comparatively

low [Figure 2-18].

According to previous research on the effectiveness of public employment service in OECD countries, it is critical for the effectiveness of labor market policy measures to have coherent integration of the three core public employment services: (1) job brokerage,(2) unemployment benefit administration, and (3) referral of the unemployed to active labor market programs (OECD, 1996a; 1997b). In most OECD countries, these services are integrated, and Korea established an integrated service offering one-stop service. The one-stop service centers handle all the conventional public employment services. They provide labor market information and counseling services, register vacancies, help with job searches and job placements, and facilitate various employment-related claims and unemployment benefits.

There was much progress in Korea's public employment service system after the crisis, and it evolved to an even more comprehensive service system. In addition to one-stop service for the core functions described above, the job centers began offering credit recovery counseling and welfare counseling, previously provided through local government offices. Ten such centers were launched in 2014, and an additional 30 centers will be added in 2015. The Korean government will set up 70 welfare-plus-job centers by 2017. According to a report from one of the welfare-plus-job centers located in the outskirts of Seoul, the center's visitors increased by 36% after welfare-related counseling was offered (a performance report of the Namyangju welfare-plus-job center is available athttp://www.work.go.kr/namyangju).

In order to provide convenient and user-friendly public employment service, the comprehensive Web-based Work-Net service was introduced in 1997, and it was updated to incorporate the recent IT development in Korea (see Box 2-2).

[Box 2-2] Work-Net

In 1998, Work-Net(work.go.kr) started its service, and provides information about job openings/searches and jobs/careers as a public employment portal. It has been providing incorporated job information from private employment portals(Jobkorea, Saramin, and Career) and metropolitan governments since July 2011. Online career services are available via smart phones and tablet PCs.

In 1995, the organization was restructured as the Central Employment Information Archive under the Ministry of Labor. Since then it began offering additional employment information services through two networks (the employment insurance network and the employment information network), turning itself into a truly central organization in employment information services. In particular, it offered employment information in a fast and accurate way and provided labor-market analysis data to respond to massive unemployment in the aftermath of the financial crisis, serving as pivotal infrastructure to overcome the unemployment crisis.

In 1998, the organization opened the Work-Net employment support information network to provide integrated employment information in the quickest and most accurate manner.

In 2001, the organization was restructured as the Central Employment Information Center under the Human Resources Development Service of Korea. Since then, it has linked work-training qualifications.

In 2006, as the Basic Act on Employment Policy was revised, the organization became the Korea Employment Information Service (KEIS), an independent employment information organization. Since then, KEIS has made its best efforts to serve as a pivotal national organization on employment information, the employment information hub, the center of employment networks, a specialized organization on workforce demand and supply, the mecca of occupational research, and the central organization for career guidance and counseling.

During 2009–2012, to achieve an efficient human resource allocation, the organization started an online career service and a service incorporating job information on the Web for job seekers and enterprises, especially for young job seekers and SMEs.

The operating structure is divided into Internet services and intranet services. Internet services provide subscribed members with local- and industry-specific regional and occupational job information. They also offer personalized information about online job applications and e-mail applications, and employment assistance such as job search history and a mail service. For subscribed enterprises, they provide regional, occupational, and major information about human resources. They also offer personalized information about online job applications and human resources management, and recruitment-support services such as applicant-selection services and university and vocational training center recommendations. There are vocational information services and employment trend services as well. Intranet services include job placements through employment center agents and local government officials. Job placements include job statistics and SMS/FAX monitoring. Intranet services not only find recruiters, they also offer various services for youth work experience and social service jobs. There are group-counseling services such as achievement programs, youth vocational-guidance programs, and job-seeking programs as well.

Users (classification) are classified as follows: external users (those who provide jobs, e.g., enterprises), and job seekers (individuals). Internal users are employment centers and local governments. The managing operator is the Korea Employment Information Service.

According to Article 18 of the Employment Policy Framework Act, "Korea Employment Information Service is established in order to efficiently carry out employment support services and entrusted services on collecting (job seeker) employment information and investigate vocational information, in accordance with Article 40."

The entrusted services in accordance with Article 40 are

- collect and provide employment and vocational information,
- work on the data related to supply and demand trends of human resources, and
- create and disseminate employment statistics.

They are currently operated by the Work-Net team in the Employment Network Division (http://www.keis.or.kr/www/staff/NR_OrganList.do).

〈Table 2-7〉 Work-Net's Yearly Job Offering, Job Seeking, Employment Status

	2008	2009	2010	2011	2012 (Jan–Oct)
Number of job applications	602,381	674,266	928,276	933,184	823,474
Number of new jobs	1,249,837	1,456,516	2,173,391	2,154,163	1,959,421
Number of new job seekers (A)	2,361,669	3,256,415	3,390,254	3,284,664	2,839,833
Number of effective jobs	1,394,663	1,669,919	3,098,692	3,155,404	2,281,325
Number of effective job seekers	5,277,601	7,618,123	8,676,838	8,269,743	8,293,439
Number of job placements	6,433,794	9,733,515	18,337,389	9,141,666	2,137,100
Number of employed	635,849	864,755	947,097	957,288	999,454
Number of employed excluding public work (B)	599,473	783,469	885,759	908,873	947,482
Employment rate (B/A)	25.4%	24.1%	26.1%	27.7%	33.4%

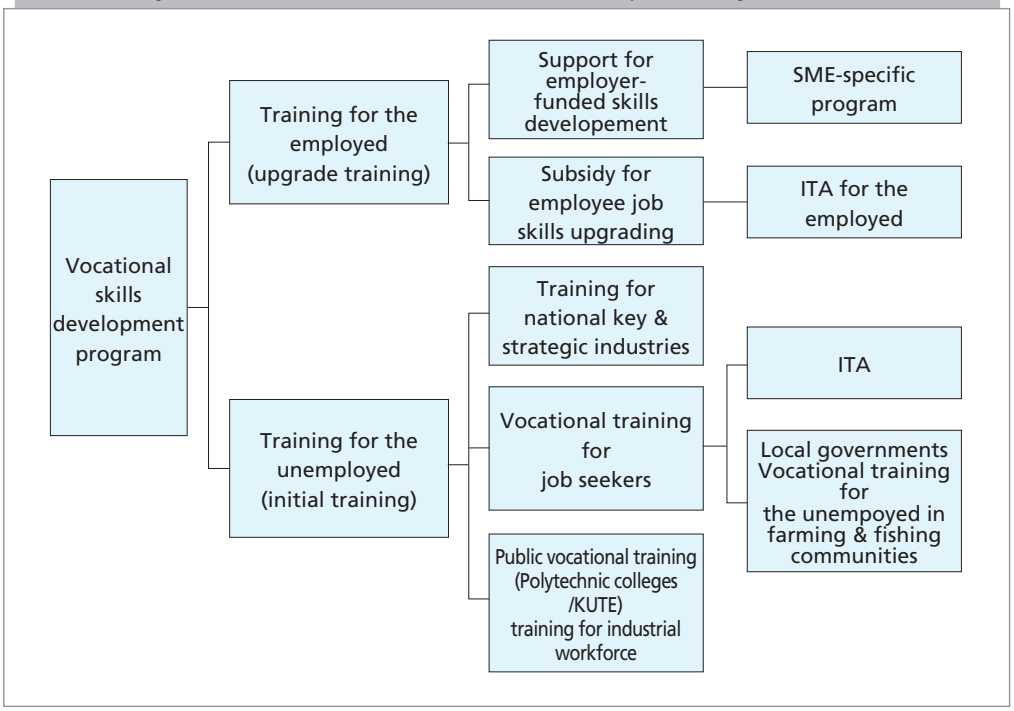
Source: Korea Employment Information Service (2012).

8. Korean Vocational Training Policies

8.1. Development of the Korean Vocational Training System

As global economic competition increasingly requires countries to compete on the quality of goods and services, every country requires a labor force with a range of mid-level trade, technical, and professional skills besides the high-level skills associated with university education (OECD, 2011). Therefore, nowadays it is critical to provide vocational training programs to promote adaptation or upgrade of workers' skills for strategic human resource management.

[Figure 2-19] Structure of Vocational Skills Development Programs in Korea



Source: Ministry of Employment and Labor, Korea (2013).

In Korea, the job-skill-development system has evolved from a government-led system to one with more private sector involvement in response to the structural change of the nation's economy, which demands a more skilled workforce (Ra, 2012). In general, vocational training is categorized into public vocational training and in-plant vocational training, according to the type of service provider. The Korean government provides public vocational training programs through several training centers all over the country. In-house (or plant) training was left to the business and was not subject to government regulation. The government provides subsidies for part or all of the training expenses as long as employers offer approved in-house programs (Kang, 2012).

During the 1990s, the vocational training system underwent a considerable revision, as the number of college graduates greatly increased and the industrial structure rapidly changed. Enrollment in primary training courses decreased while secondary training and job-conversion training courses were more in demand. The current structure of vocational skills development programs in Korea is shown in [Figure 2-19]. The most important aspect of the current structure is the improvement of the program's effectiveness, and emphasis is placed on the vocational training programs for the employed rather than the unemployed (Lee *et al.,* 2014).

In 1995, the EIS introduced a new training system as one of its components. The new system consists of four different schemes that provide subsidies to(1) employers who operate in-plant training systems,(2) employers who allow paid leave for the purpose of further training,(3) employers who enroll their employees in education and training courses operated outside their firms, and(4) employees and older workers who pursue further education (this includes tuition loans). Because of the timely introduction of EIS, the Korean government could respond swiftly to the increased demand for vocational training during the financial crisis. The 1999 data on the expenditures and the number of participating employers suggest that in-plant vocational training is most important among the four programs <Table 2-8>. The training programs are financed through employers' mandatory contribution to the EIS. Overall, the EIS funds 40% to 90% of the training costs.

〈Table 2-8〉 Training Programs for the Employed, January to June 1999

	Total	In-plant vocational training	
Number of firms providing training	23,011 (100%)	16,338 (71%)	
Number of trained workers (A)	266,478 (100%)	257,069 (96.5%)	
Program expenditures(000s of won) (B)	44,842,332 (100%)	27,776,943 (61.9%)	
Average expenditure per participant (B/A)	168.3	108.1	
	Paid training leave	**Subsidies for course attendance**	**Loans for school fees**
Number of firms providing training	148 (0.6%)	*	6,525 (28.4%)
Number of trained workers (A)	1,425 (0.5%)	15 (0%)	7,963 (3%)
Program expenditures (000s of won) (B)	2,604,783 (5.8%)	13,525 (0%)	14,447,081 (32.2%)
Average expenditure per participant (B/A)	1,827.9	901.7	1,812.9

Note: Data not available.
Source: KLI (1999a).

Training programs for the unemployed also expanded quickly during the financial crisis. The main training programs offered to the unemployed were as follows. The first program was the reemployment training of workers dismissed from the employers covered by the EIS. The second were the training programs for employment promotion. This program focused on dismissed workers not insured by the EIS (mostly temporary, daily, and part-time workers). The third and fourth programs were training for unemployed who newly entered the labor market and training programs for business start-ups targeted at elderly unemployed, disabled individuals, and school dropouts. Finally, human resource development training programs that provide craftsmanship training and training for 3D (difficult, dirty, or dangerous) jobs were also offered. While the first program was funded by the EIS, the others were financed through the general government budget. The participation rate was great: between 1998 and 1999, more than 350,000 people, about one-fifth of the total unemployed, attended training courses <Table 2-9>.

However, most of these training programs have relatively high dropout rates, and possibilities for reemployment after completing the training courses remain low. Based of the OECD countries' experience, the future of training program reforms should take into account the following suggestions. First, it is important to better target the programs for the disadvantaged labor market groups. According to the evaluations of the training for the unemployed, well-targeted programs tend to be relatively successful. For example, the positive labor market outcomes seem to outweigh the costs to train disadvantaged women and those unemployed at the risk of becoming long-term unemployed. Second, training program reforms can also improve the provision of the proper content of a training program so it can match the need of the unemployed. Training vouchers can be a solution but only when the public employment programs provide appropriate professional guidance with them (OECD, 2013).

〈Table 2-9〉 Outcomes of Training Programs for the Unemployed

	Total	Reemployment training[a] of the unemployed under the EIS	Training programs not financed by the EIS					
			Reemployment training[a] of the unemployed under the EIS	Craftsmen	3Djobs	Business start-ups	New labor market entrants	Other programs
1998								
Total number of trainees	362,941 (100%)	170,096 (46.9%)	101,709 (28%)	14,515 (4%)	11,000 (3%)	13,598 (3.7%)	4,012 (11.9%)	9,011 (2.5%)
Number of trainees who completed the course	193,837	116,429	37,465	12,942	8,724	12,515	5,762	*
Completion rate[a]	53.4%	68.4%	36.8%	89.2%	79.3%	92%	13.4%	*
Found employment[b]	43,470 (22.4%)	26,193 (22.5%)	7,218 (19.3%)	6,326 (48.9%)	2,610 (29.9%)	561 (4.5%)	562 (9.8%)	*
1999								
Total number of trainees	358,351 (100%)	226,356 (63.2%)	69,466 (19.4%)	16,817 (4.7%)	9,122 (2.5%)	7,725 (2.2%)	10,022 (2.8%)	18,843 (5.3%)
Number of trainees who completed the course	131,638	93,268	21,534	4,576	936	4,933	3,872	2,519
Completion rate[a]	36.7%	41.2%	31%	27.2%	10.3%	63.9%	38.6%	13.4%
Found employment[b]	48.864 (37.1%)	36,223 (38.8%)	7,299 (33.9%)	1,672 (36.5%)	936 (100%)	517 (10.5%)	1,608 (41.5%)	607 (24.1%)

Note: Data not available

[a] Completion rate equals the number of trainees who completed the course divided by the total number of trainees.

[b] The figures in parentheses are the proportion of trainees who found employment and are calculated over those who completed the course.

Source: Ministry of Labor (2002).

8.2. Financing Vocational Training Programs in Korea

The most challenging issue in public employment service and skill-development programs in Hungary is the overall lack of a solid funding source, as in many developing countries. An appropriate financing policy is needed to secure funding for policy implementation and improvement of policy outcomes.

Hungary needs to develop various vocational training programs to enhance the possibility for future employment of the currently unemployed and other disadvantaged groups. Even though this need is well recognized by the Hungarian government and the public, the lack of funding prevents them from implementing effective measures. In Hungary, as in other newer EU countries, the European Social Fund (ESF) has funded active labor market programs (ALMPs) and, thus, offset at least some of the decline in state ALMP funding. However, the ESP could not replace the state's funding source of ALMPs permanently, and Hungary needs to find a solid system to fund ALMPs. For this purpose, the Korean Employment Insurance system provides a good example.

〈Table 2-10〉 Share of EU27 Expenditure (2008) on ALMPs by Type of Measure

Measure	% of total ALMP expenditure
Training	39.0
Employment incentives	24.0
Supported employment and rehabilitation	16.1
Direct job creation	13.4
Start-up incentives	7.2
Job rotation and sharing	0.4

Source: Eurostat.

In this section, we present the information on the Korean EIS contribution rate in detail. In addition, we examine separately the international experience with training levy schemes to find a policy implication for Hungary. In many countries, the training expenditure is the largest expenditure of all ALMPs. As can be confirmed in <Table 2-10>, the training expenditure is 40% of all expenditures in 27 European Union countries.

Vocational Training Levy System (Levy-Grant)

In the mid-1970s, the South Korean government introduced the "Vocational Training Levy System" (VTL), which was a fiscal milestone in establishing a public vocational training system. The VTL is a levy-exemption system that imposed duties on training and penalties for not implementing training in plants. The VTL system aimed to fulfill the demand for the general skills necessary for economic growth. The VTL system enforced levies on large companies, as large companies were considered to have the capacity to provide vocational training. The state also provided public vocational training services. Large companies were able to provide and procure skills autonomously; however, the SMEs could not achieve the capacity of a self-sufficient training system. Furthermore, there were few private vocational training institutions to support SMEs' vocational training due to the uncertain profitability in the private sector. As the Korean government introduced the Employment Insurance Act in 1995, the VTL system ended.

Newly introduced through EIS is a levy-grant system based on employment insurance premiums. Therefore, it provides subsidies to companies that offer training services in plants. The EIS enforces budget reserves in order to promote upgrade training of the employed. Even though the income-redistribution effect was expected for SMEs through the new system, training opportunities for vulnerable groups and SMEs were diminished after EIS was introduced. Therefore, the current task is to focus on the equity of vocational training in Korea rather than its efficiency.

<Table 2-11> and <Table 2-12> show the sum of the contribution rates. The three main EIS programs do not exceed 3% of the total payroll. The financial situation of the Employment Insurance Fund (EIF), a special account in the Bank of Korea, and the macroeconomic situations determine the contribution rate. All contributions for EIS are deposited into the EIF managed by the Ministry of Labor.

〈Table 2-11〉 Contribution Rate of Each Program (1995~2003)

(unit: %)

		July 1, 1995–Dec. 31, 1998		Jan. 1, 1999–Dec. 31, 2003	
		Employees	Employers	Employees	Employers
Unemployment benefits		0.3	0.3	0.5	0.5
Employment Stabilization Program		-	0.2	-	0.3
Vocational Competency Development Program	<150 employees	-	0.1	-	0.1
	>150 employees (priority firms)	-	0.3	-	0.3
	Vocational Competency Development Program (150–999 employees)	-	0.5	-	0.5
	Vocational Competency Development Program (1,000+ employees)	-	0.5	-	0.7

Source: Ministry of Labor (2012).

〈Table 2-12〉 Contribution Rate of Each Program (2003~2014)

(unit: %)

		2003-2005		2011-2014	
		Employees	Employers	Employees	Employers
Unemployment benefits		0.45	0.45	0.55	0.55
Employment Stabilization Program		-	0.15	-	-
Vocational Competency Development Program	<150 employees	-	0.1	-	0.25
	>150 employees (priority firms)	-	0.3	-	0.45
	Vocational Competency Development Program (150–999 employees)	-	0.5	-	0.65
	Vocational Competency Development Program (1,000+ employees)	-	0.7	-	0.85

Source: Ministry of Employment and Labor (2014).

[Box 2-3] The Employment Insurance System in Korea

The EIS was set up in 1995 as a part of the social protection system with the Industrial Accidents Compensation Insurance, Medical Insurance, and the National Pension System. The EIS was designed as a comprehensive system that helped not only to reduce the risk of income loss when unemployed but also to support employment and vocational competency and offer employment assistance. The three major components of the EIS are the Employment Stabilization Program, the Vocational Competency Development Program, and the Unemployment Benefit Program.

The EIS was initially set up to provide protection for regular workers in firms with more than 30 workers. The employment security and skill-development components were only available to firms with more than 70 workers. However, during the 1997 economic crisis, the EIS expanded in January 1998 to include coverage for firms with more than ten workers, five workers in March 1998, and finally, all firms regardless of their staff size (Ministry of Labor, 2005).

The EIS funding source is from social contributions calculated as a proportion of the total wage. Three different contribution schemes are applied: (1) the employment security part of the EIS is 0.3% of the total wage,(2) for vocational training, the contribution rate runs from 0.1% to 0.7% of the total wage, depending on the size of the firm, and (3) for the unemployment benefits, the contribution rate is 1% of the total wage. Employers pay the contributions for the employment security and training part of the EIS. Both employers and employees contribute equally to the unemployment benefits. Total contributions are usually 2% of the total wage but can be raised to 3% of the wage when economic situations call for it. The EIS fund kept a surplus before the 1997 financial crisis because Korea had maintained nearly 100% employment between 1995 and 1997, and there was no major spending.

Employment Stabilization Program	Employment adjustment assistance, regional employment promotion grants, employment promotion subsidies for the elderly, employment promotion facility subsidies, provision of labor market information.
	Employment promotion subsidies, shift-work change assistance, S & M expertise employment subsidies, SME working hour reduction assistance, SME working condition innovation assistance, SME new industry advancement subsidies, employment maintaining assistance, outplacement assistance subsidies, reemployment subsidies, construction worker EI maintenance assistance, construction worker installment of retirement deduction assistance, construction worker continuous employment assistance, childcare leave allowances, post- and prenatal vacation allowances, childcare facility assistance, continuous employment after childbearing and childbirth assistance, peak-wage preservation allowances, job exhibition assistance, and other sub-programs

Vocational Competency Development Program	Vocational competency development training (in-house vocational training subsidies, employee training subsidies, loans for training facilities, aid for reemployment training of displaced workers), assistance with training fees
	Paid-leave training, outplacement training, vocational competency development account system, training course assistance, vocational competency development card system, female household-head training, priority job training, and other sub-programs
Unemployment Benefit Program	Job-seeking benefits, distant-area job-seeking benefits, moving assistance, early reemployment allowances
	Injury and disease allowances, job capability improvement allowance, and other sub-programs

Source: Ministry of Labor (2010).

8.3. New Challenges of the Korean Training System

Since the 1997 financial crisis, the population that fell into the low-income group increased, resulting in income polarization. It is necessary to break the vicious circle of low income leading to low skills and vice versa. However, there is a high possibility for those who are in the vulnerable groups to be excluded from the current vocational training funding system since they are not qualified to be insured by the EIS. As a result, vulnerable groups' demand for vocational training is likely to decrease without adequate support for training costs and income compensation.

Korea's vocational training funding system focuses more on the employed than the unemployed, since the positive externality is more prevalent in the general job competency training that is more suitable for the unemployed. There is also a gap between large firms and SMEs in the provision of job training for their workers. SMEs are likely to invest inadequately in their workers' job training due to budget constraints. There are differences in investment patterns for vocational training between big firms and SMEs. Few enterprises with 10–29 workers provide vocational training within their plants, and they provide only a small number of workers with opportunities for training. Furthermore, many SMEs do not provide any training opportunities to low-skilled and low-wage workers who are most likely to need vocational training.

As of 2008, Korea's vocational training participation rate was around 27%, which is above the average of the EU 25 countries' participation rate of 20.7%, but it is under the average of the EU 25 countries without the transition countries (28.2%). In Korea, there are 37 hours per year of vocational training, which is still relatively short compared to EU countries(an average of 66 hours per year in the EU

25 countries) (Lee, 2008).

Overall, the vocational training system needs to change from a supplier-oriented service to client-oriented services in order to deal with new threats to the Korean economy. As income distribution in Korea became more polarized, a new group with special needs emerged. For example, traditionally, the vulnerable groups were those of absolute poverty, females, the disabled, and the elderly; however, after the crisis, long-term unemployment, nonregular workers, SMEs, and manufacturing workers newly emerged as large parts of the vulnerable groups. Therefore, vocational training service must be extended to cover the needs of these working poor groups.

The Korean government launched a consortium for vocational training for SMEs. The government provides expenses for facilities, equipment, labor costs, and training courses to the SME training agency consortium in order to promote the vocational capacities of SME employees. In 2013, the project modified its regulations to better serve the demands of the firms and expanded the scope of its beneficiaries by evaluating not only the programs of the first participating firms who directly contracted with the government, but also the participation rates of the second and third participating firms.

With a constant increase of the consortium offices and implementation of more effective and diverse vocational trainings, 223,186 workers from 32,623 firms participated in the programs. Additionally, among the graduates of the training programs for future employees, 76.9% were employed in 2013. Overall, the program was significantly effective, improved the vocational skills of SME employees, and solved the mismatch problem between employers and jobseekers by providing adequate training to the unemployed (Ministry of Employment and Labor, 2014b).

The Korean government has also supported the SME learning organization. In order to increase, share, and create knowledge, experience, and expertise in SMEs, the government supports the establishment of a learning culture and building a learning infrastructure in SMEs, which strengthens competitiveness and enhances their employees' vocational skills. SMEs are experiencing difficulties developing formal vocational training because of the lack of infrastructure and their need for a constant labor supply. They are also interested in developing firm-specific skills, which are learned mostly within the workplace. In 2006, HRD Korea implemented a program supporting the organized vocational training in SMEs, which helps systematic learning and transmission of job-related knowledge, skills, and experience within the workplace. It provides funding for organized learning activities, invitations to professional trainers, learning networks, and awards for

excellent participants for selected firms for one year (renewable up to three years). Because many SMEs have difficulties finding substitute labor for trainees, it offers a program that connects work and education, so the employees can participate in the program while still working. In 2013, 1,725 learning organizations from236 SMEs were funded by this program, which greatly contributed to the establishment of the SME vocational education system.

According to the evaluation of the 2013 Support for Learning Organization, the support contributed to SME participation in the vocational training program and use of firm-specific skills (Ministry of Employment and Labor, 2014b).

The Korean government offers excellent training courses for SME employers and employees to improve their core vocational capacities and, thus, contribute to the SMEs' competitiveness as well. Most of the courses are practical training courses that focus on problem solving and case studies. In 2012, the program was divided into intermediate courses ("general training") and advanced courses ("special training") for core skilled workers (Ministry of Employment and Labor, 2014b).

In order to address these changes more efficiently, the Korean government also reorganized the information system for vocational education and training services and launched a new Web-based information system called HRD-Net in 2003 and expanded its functions to meet the users' new demands. With this new user-friendly information system, the government aims to improve its effectiveness in providing practical information for vocational training (see Box 2-4).

[Box 2-4] HRD-Net

HRD-Net supports vocational training programs, trainee registration, and training costs with job centers, local governments, and training institutions. Additionally, HRD-Net provides a variety of information on training and online enrollment such as personalized information and individual training histories on its homepage for lifelong learning.

In 2003, HRD-Net was reformed as part of the vocational training system, and in 2006, it completed its reform as the Internet-based vocational training information service. In 2008, HRD-Net started an individual vocational training account system and expanded the account system in 2009. The vocational training-certification-work information was connected in 2012, and it began providing mobile services in 2015.

The Korea Employment Information Service operates the HRD-Net. The Human Resources Development Team within the Employment Network Division is in charge of managing and developing HRD-Net. Customers are divided into nonmembers, individual members, and enterprise members and operated accordingly.

The provided services are as follows:

Training information	• State-funded vocational training • Employer-funded vocational training • Integrated training courses • Vocational training for job seekers • Vocational training for the employed • Evaluation grades for training institutions
Qualification information	• Job-field searches • Yearly exam schedules • National technique qualification • National professional qualification • Authorized private qualifications
Job information	• Recruitment information • Job-field searches • Regional searches • Customized searches
Open sources	• e-Learning • Broadcasted lectures on vocational training

Source: HRD-Net webpage.

8.4. Other Advanced Countries' Cases

There are various ways to fund training programs. The main issues are whether the enterprises pay the EIS premium with or without the state funding and how the prices of the training units are measured. According to these two standards, we can categorize the funding systems of other countries. <Table 2-13> compares the funding systems of five different countries.

〈Table 2-13〉 Vocational Training Funding System in Five Countries

	Employment insurance premium levy	Training unit price
USA	* Government does not levy employment insurance premiums on companies. * Upgrade training for the employed is autonomously decided. * However, government provides subsidies for retired employees and workers from vulnerable groups.	* State funding for vocational training is provided through Individual Training Account voucher under the Workforce Investment Act. * However, when there are no proper training institutions, government provides with subsidies, or training programs.
Germany		* A voucher system (Bildungsgutschein) add-up training price per hour according to allocated vocational training numbers, categorize hourly training price according to training courses, and calculate average training price by training courses.
Japan	* Government levies employment insurance premiums on companies * Government provides different subsidies according to the business scales for upgrade training.	* Voluntary training and company-provided trainings are autonomously funded. * Government covers all of the training costs for retired employees.
Spain		* Training for the employed is a tripartite decision. * Training cost is based on the previous employment insurance premium payment decided according to business scale and reduced from the next year's levy. * Large company should provide more than 40% of the cost autonomously. * Aims to promote flexibility, objectivity, and efficiency of financial support while keeping bureaucratic regulation at a minimum.
Korea	* Government provides different subsidies according to the business scale; however, the difference is relatively lower than other countries. * Government provides relatively more subsidies for companies than other countries.	* Introduction of Vocational Training Development Account System results in the activation of the market function; therefore, the training price unit is decided within the market.

Source: Construction of Achievement Index for KOPIA Project (Park, 2014).

9. Active Labor Market Programs for the Working Poor in Korea

The socioeconomic status of working poor households in Korea is shown in <Table 2-14>. Female-headed households are more likely to fall in the working poor category than male-headed households are. The households that are in working poor condition have household heads who are generally less educated and older than 60.[23] Four-person households account for 27.1% of the working poor and together with two-person households, they account for more than 50% of the working poor households.

〈Table 2-14〉 Socioeconomic Characteristics of Working Poor Households (2012)

(Unit: %)

	Working nonpoor	Working poor	Total poor
Gender			
Male	87.3	58.5	45.0
Female	12.7	41.5	55.0
Age			
under 20	5.7	2.5	2.5
30s	33.6	16.0	6.6
40s	35.9	30.9	11.8
50s	18.2	17.8	12.5
above 60	6.6	32.9	66.5
Education level			
Middle school graduate	20.6	36.3	60.3
High school graduate	43.6	39.8	26.0
Junior college graduate	8.3	12.6	5.3
College graduate	23.3	8.4	7.1
Graduate school graduate	4.1	2.9	1.3

23) Note that the households headed by those in their 40s also account for a higher ratio of the working poor. This is due mainly to the fact that the households headed by those in their 40s are the largest group.

〈Table 2-14〉 continued

(Unit: %)

	Working nonpoor	Working poor	Total poor
Household scale			
Single member	1.6	14.9	47.5
Two person	9.8	25.4	30.5
Three person	21.5	20.4	10.6
Four person	44.6	27.1	8.2
Five person	15.8	8.6	2.6
More than six persons	6.8	3.7	0.7

The working poor's employment status among the economically active population indicates that most of them are daily workers. Currently, there are slightly more working poor who are employed than unemployed; however, most of them have unsecured temporary jobs. This emphasizes the importance of vocational training for the working poor in order to get permanent or temporary jobs. However, the high proportion of daily jobs proves that daily livelihoods rather than job quality or job security are most important to the working poor <Table 2-15>.

In order to address the poverty issues of the working poor, the Korean government has launched two programs that offer comprehensive services combining vocational training and welfare programs: (1) Successful Employment Package Program and (2) Hope Ribbon Project.

Successful Employment Package Program

The Successful Employment Package Program was introduced in 2009 to provide subsidies (up to KRW 2 million, about USD 2,000 per person) for self-leading vocational training, and participants can choose the programs that are suitable for themselves. Participants are selected based on individual vocational training history and participation history, possession of certificates, and their desired job field. Both unemployed and employed (temporary and daily workers, workers in SMEs) can participate regardless of whether they are insured by EIS. By including the participants not insured by EIS, it aims to solve the problem of exclusion within the labor market. Participants use the "Learning Card System" to participate in training.

〈Table 2-15〉 Composition of Working Poor Based on Employment Status

(Unit: Number of people)

Work capacity / Employment status				Poor strata lower than medium 50				
				Total (A+B+C)	Working poor with work capacity			Incapability
					Subtotal (A+B)	Work capacity (A)	Work incapability (B)	Incapability (c)
Economically active population	Employed	Wage worker	Permanent	117	104	88	16	13
			Temporary	351	232	195	37	119
			Daily	743	356	278	78	378
			Subtotal	1,211	692	561	131	519
		Nonwage worker	Nonwage	1,034	368	242	126	666
			Subtotal	2,245	1,060	803	257	1,185
	Unemployed			290	223	189	34	67
	Subtotal			2,535	1,283	992	291	1,252
Economically inactive population	Above 15		House maker	553	340	254	86	216
			Miscellaneous	3,866	773	185	588	3,093
			Subtotal	4,422	1,113	439	674	3,309
	Under 14			675	524	-	524	151
	Subtotal			5,097	1,637	439	1,198	3,460
Total				7,632	2,920	1431	1,489	4,712
% of total population				(15.6)	(6.0)	(2.9)	(3.0)	(9.6)

Source: Korea Research Institute for Vocational Education and Training (2014).

〈Table 2-16〉 Participants in the "Successful Employment Package Program" and Performance

(Unit: Number of people, %)

Year	Participants	Finished	Employed	Insured by EI	Employment retention rate	
					Longer than 3 months	Longer than 6 months
2009	9,082	9,082	5,600 (61.7)	4,264 (76.1)	3,077 (72.2)	1,865 (43.7)
2010	25,228	25,109	15,125 (60.2)	12,834 (84.9)	9,411 (73.3)	7,024 (54.7)
2011	56,531	30,397	60,397 (53.8)	25,711 (84.6)	17,435 (67.8)	10,824 (42.1)

Source: Ministry of Employment and Labor (2013).

The Successful Employment Package Program has been successful. In 2009 and 2010, all or most of the participants finished the program, and more than 60% of those who finished were employed. In addition, more than 70% of the participants in 2009 and more than 80% of the participants in 2010 and 2011 became insured through employment insurance. The employment retention rate also shows that above or nearly 70% of the employed remained employed longer than three months, and around 40%–50% of people remained employed longer than six months.

〈Table 2-17〉 Performance of the Successful Employment Package Program among Basic Livelihood Security RecipientsBasic Livelihood Security Recipients

(Unit: Number of people, %)

Year	Number of recipients	Finished (a)	Employed (b)	Employ ment rate (b/a)	Exit from bene ficiary	Employment retention rate	
						% of the finished (c/a)	% of the employ-ed (c/b)
2009	2,368	2,368	921	38.9	530	22.4	57.5
2010	2,505	2,499	964	38.6	570	22.1	54.7
2011	7,869	7,010	2,859	40.8	1,197	17.1	41.9

Source: Ministry of Employment and Labor (2013).

The performance of the Successful Employment Package Program among the basic livelihood security recipients indicates that the program positively affected the employment of the basic livelihood security recipients. Almost all of the participants finished the program and around 40% were employed, and the employment retention rate shows that when employed, around half of them succeeded in maintaining their jobs.

Hope Ribbon Project

The Hope Ribbon Project was implemented also to promote employment and help establish start-ups for low-income groups. The Ministry of Health and Welfare runs and supervises the project. It provides welfare services at an individual level. Participants of the Hope Ribbon Project are mainly those under or near the poverty line. The project also covers dropouts from the Successful Employment Package Program, those who are excluded from conditional recipients, and homeless people. The Hope Ribbon Project is also linked to the Learning Card System (Korea Research Institute for Vocational Education and Training, 2014).

〈Table 2-18〉 "Hope Ribbon Project" Participants

(Unit: Number of people, %)

Year	Recipients				Near poverty line	Total
	General recipients	Self-support	Conditional recipients	Subtotal		
2009	398 (19.9)	12 (0.6)	1,137 (56.9)	1,547 (77.3)	453 (22.7)	2,000
2010	982 (30.1)	25 (0.8)	2,599 (79.7)	2,599 (79.7)	661 (20.3)	3,261
2011	1,882 (43)	42 (1)	3,518 (80.4)	3,518 (80.4)	858 (19.6)	4,376
2012	1,477 (35.9)	51 (1.2)	3,492 (84.8)	3,492 (84.8)	624 (15.2)	4,116
2013	2,410 (24)	96 (1)	8,620 (85.7)	8,620 (85.7)	1,434 (14.3)	10,054

Source: Ministry of Health and Welfare (2014).

As we can see in <Table 2-18>, the number of Hope Ribbon Project recipients is increasing. The number of participants in total has increased dramatically from 2012 to 2013. The number of those who fall in the near-poverty category in the project has increased. However, their ratio remains around 15%. Among the project recipients, a majority are conditional recipients.

〈Table 2-19〉 "Hope Ribbon Project" Performance (based on institutions' beneficiaries)

(Unit: Number of people, %)

Year	Number of personnel	Employment and start-up (1st level)	Employment retention for more than 6 months (2nd level)	Exit from beneficiary (3rd level)
2009	2,000	636 (31.8)	329 (51.7)	181 (9.1)
2010	3,261	1,427 (43.8)	844 (59.1)	592 (18.2)
2011	4,376	2,195 (50.2)	1,317 (60)	820 (18.7)
2012	4,116	1,772 (40.5)	933 (52.7)	555 (12.7)

Source: Ministry of Health and Welfare (2014).

The performance of the Hope Ribbon Project shows that the employment rate among its participants has increased since 2011, up to 50%, but decreased to 40% in 2012. When employed, more than half of the employed maintain their jobs for longer than six months. The number of people who were able to stop receiving benefits reached its peak in 2011, up to 18.7%, and decreased to 12.7% in 2012.

As we can see from <Table 2-20>, many advanced countries reformed their welfare system for the vulnerable groups to give enough incentives to engage in the labor market actively. The USA, for example, started the earned income tax credit(EITC) program in 1993 to motivate welfare recipients to take part in active job searching and training programs.

〈Table 2-20〉 Vocational Training for the Vulnerable Groups in Four Countries

Countries	Programs
USA	• Personal Responsibility and Work Opportunity Act promotes a workfare system based on the Financial Work Incentive Program. • EITC was introduced in 1993. • Recipients can receive benefits for a maximum of five years to prevent vulnerable groups from being dependent on the welfare system. • Standardized policy union focused on working poor has been established. • Integration of Affirmative Labor Market Program and financial incentive.
France	• Revenue de Solidarite Active was introduced in 2009. • It integrated former work-poor income security. • It switched from an employment-based program to a job-placement program through short-term job counseling.
Germany	• In 2004, Hartz Ⅳ Innovation lead to an overall amendment of the working poor support program. • The public assistance program was reformed. • • Basic income security for job seekers: "Grundsicherung fur Arbeitsuchende" for the vulnerable groups was detached. • It enhanced the short-term job-placement program for those who are employable.
UK	• In 2013, Universal Credit System was introduced. • It reinforces the financial incentive system for the vulnerable groups, e.g., Working Families Tax Credit. • It provides income tax deduction for the employed households.

Like Hungary, one of the challenging issues in the Korean labor market is the low labor-participation rate of the female workforce. The employment rate of the female workforce in Korea was 53.6% as of 2013, and it fell in the lowest group among OECD countries. In order to promote the female employment rate, the Korean government recently launched several programs. The Act on the Promotion of the Economic Activities of Career-Break Women was enacted for this purpose. The goal of this Act is to contribute to women's economic self-reliance and self-realization and the sustainable development of the national economy by promoting the economic activities of career-break women, etc. Through implementing such policies as maternity leave, family care leave, paternity leave, as well as through supporting daycare centers within firms and founding more public daycare centers, the Act helps women maintain their family lives and careers at the same time. It particularly protects young women, pregnant women, and new mothers through maternity leave, period leave, miscarriage leave, etc., and supports the job stability of these women by paying incentives to the firms that hire temporary workers to substitute for the women on maternity leave and other related leaves. It also

promotes equality between the sexes by legally prohibiting discrimination and sexual harassment in the workplace.

In order to promote women's employment and job stability, the Korean government also supports the firms that build or renovate women-friendly facilities such as breastfeeding rooms, changing rooms, lounges, dorms, shower facilities, and bathrooms by paying for the construction and management of these facilities.

The Korean government set up the Center for Career-Break Women in 2009. This center provides individual and group counseling, vocational training, an internship program, and job placement for women who took a career break after pregnancy, childrearing, or caring for family members. The group counseling also focuses on confidence building and life planning in addition to career counseling. After the individual career counseling, the participants are regrouped into "immediate jobseekers," "participants of group counseling," and "those in need of vocational training." Through its system, the center supports women who want to restart their careers and promotes the employment of women. <Table 2-21> shows the trend in the numbers of group-counseling participants, which is one of the programs offered in the center. The numbers of participants have increased substantially since the program was launched.

〈Table 2-21〉 Performance of Group Counseling in the Center for Career-Break Women

Year	Number of participants	Number of graduates	Number of employed	Employment rate
2009	11,258	10,955	4,574	41.8%
2010	17,482	16,992	6,594	38.8%
2011	19,851	19,348	5,196	26.9%
2012	20,739	20,362	5,245	25.8%
2013	24,429	23,991	4,765	19.8%

Source: Ministry of Employment and Labor (2014a).

10. Conclusion and Policy Recommendations

The main task of this part of the Hungary KSP is to shed light on a direction for the reform of the Hungarian public employment and vocational training system for effective use of human resources by analyzing Korea's experience. This chapter started with an analysis of the historical and institutional aspects of the Hungarian labor market structure. Specifically, the recent development of the Hungarian public employment service and skill-development system was analyzed along with the challenges that the Hungarian labor market faces nowadays. From the numerous analytical results drawn from this chapter, the policy suggestions for reforming the Hungarian active labor market programs are summarized as follows.

First, it seems that the most important part of all the successful active labor market programs is a reliable funding system. Even though the Hungarian government has recently tried to implement various active labor market measures to improve their labor market conditions, they still face many challenges in implementing further labor market reforms due to the lack of a sustainable funding source. Factors such as low employability, a high youth unemployment rate, and a significant gender gap in employment are the most serious challenges. The lack of a sustainable funding system for active labor market programs such as public employment service and skill-development programs corroborate these difficulties. In order to implement a reform to revitalize the labor market, which eventually can lead to a higher employment rate for the youth, women, and other vulnerable groups that generally stay unemployed long term, the Hungarian government should set up a sustainable funding system. Korea's experience during the financial crisis clearly showed that the existence of a reliable funding system could make a huge difference in carrying out active labor market policies in a timely manner. The Hungarian government can significantly boost and develop its successful active labor market programs by considering these reforms in Korea.

Second, the effectiveness of ALPMs is directly affected by the timing of the implementation of such programs. As we observe from the Korean cases during the 1997 financial crisis, active labor market programs have larger impacts when implemented during times when economies suffer higher unemployment rates due to economic crisis or slow economic growth. Labor market conditions make a difference in the relative efficacy of the corresponding active labor market programs. It is noteworthy that the Korean public employment service and vocational training programs along with the other active labor market measures were considerably reorganized and expanded to deal with the imminent massive unemployment that would follow the 1997 Asian financial crisis hitting the country. The prompt and extensive responses by the Korean government were all possible, thanks to the timely introduction of the Employment Insurance System in 1995. With

the EIS funding, the Korean government not only provides unemployment benefits but also expands public employment service, public work programs, and other job training programs to help the unemployed find new jobs. Unlike unemployment insurance systems in many developed and developing countries, the Korean EIS was implemented as a comprehensive system by covering the employment stabilization program, the vocational competency development program, and the unemployment benefit program. The timing of the comprehensive EIS introduction immediately before the 1997 Asian financial crisis was a critical factor in its success in dealing with the threat of possible massive unemployment.

Third, all the services for job search assistance and vocational training programs provided by government agencies and private sectors should be easily accessible so that participants can be encouraged along the process of the program they choose to take. Many advanced countries including Korea offer comprehensive and user-friendly public employment services and skill-development programs that are linked to the welfare system. As we saw from Korea's experience, the one-stop-service system for employment and vocational training expanded to include nontraditional welfare services such as credit recovery counseling as well as a welfare counseling service. It is also crucial that the public employment and vocational training service provide services for employers. Like most developed countries, the Korean government also provides subsidies and information services for employers with its public employment service and job training service system.

With help from recent developments in information technology, many countries have tried to make their public employment service and vocational training service user friendly by setting up an online-based service system. Systems such as Korea's Work-Net and HRD-Net are good examples that the Hungarian government can consider when setting up a similar system of easily accessible online services. With these online-based service systems, people can access the service easily and timely, thus, enabling them to acquire potential jobs successfully.

In addition, individually focused comprehensive services including public employment, vocational training, and welfare can be easily available through the online-based system because it is possible to compile all the relevant individual data without a huge effort and cost. Amongst the various services available through such online-based systems, the most common services are personalized information relating to online job applications, and human resources management and recruitment-supporting services such as applicant selection and recommendation aid for suitable vocational training programs. In Korea, intranet and Internet services are not only locating recruiters but also offering various services relating to youth work experience and social service jobs. There are also group-counseling services such as achievement programs, youth vocational-guidance programs, and

job-seeking programs. The accessibility of information and data relevant to these programs is substantiated by the use of efficient online resources.

Fourth, many advanced countries work closely with private sectors for job assistance programs and vocational training programs, as we saw in Korea's experience. Government programs are complemented by NGOs (nongovernment organizations) and other private sectors in Korea. Employment services become more accessible and diversified by maintaining a close partnership with private sectors. The relative efficacy of these programs depends on whether or not government agencies can maintain these well-established partnerships with said NGOs. Private sectors and nongovernment institutions increase the productivities of these programs by offering competition, flexibility, as well as monitoring roles. Training programs in Korea have rapidly expanded since the financial crisis. Obviously, some difficulties and problems accompanied such rapid expansion. The expedited growth and expansion of the programs can easily result in the deterioration of quality. Close collaboration with private sectors, especially business sectors, can offer a good solution for such problems and difficulties. Such collaboration can contribute to enhancing program design and the program's delivery system. The approach of private sectors is more market oriented and, thus, can eliminate unnecessary red tape that is more common in public programs. The Hungarian government also recognized the importance of the private sector's involvement for the efficacy of vocational training programs and recently set up programs by expanding the private sector's involvement. It is crucial to maintain such involvement to ensure the success and efficacy of the job assistance and vocational training programs.

Fifth, targeted group approaches in public employment service and vocational training service can be very effective to reduce long-term unemployment. According to a recent comprehensive study on effectiveness of ALMPs in many different countries, there is a significant difference in the impact of ALMPs across groups. The impact on females and participants from long-term unemployed such as the less educated is larger, and we tend to find smaller effects for older workers and youth. Additionally, there is much evidence that suggests that certain types of programs work more efficiently for specific groups. For instance, the job assistance programs seem to be more successful for disadvantaged groups, whereas training and private sector employment subsidies tend to work for those who have been in a long-term unemployed status (Card *et al.,* 2015),so it is highly suggested to provide active labor market programs for targeted groups.

In order to improve the employability of vulnerable groups, the Korean government launched two programs that offer comprehensive services combining vocational training and welfare programs: the Successful Employment Package

Program and the Hope Ribbon Project. These two programs have positively affected the employment of vulnerable groups. These programs seem to provide some significant implications for the Hungarian government's labor market reform, since Hungary also suffers from low employment and lack of skills among the vulnerable groups. Making sure to use such targeted group approaches has been essential in maintaining the efficiency of the ALMPs.

Finally, any labor market reforms in public employment service and skill-development programs cannot be successful if the government (or markets, if applicable) neglects the following areas: First, systematic assessment and monitoring of the existing labor market program implementation to evaluate their effectiveness. Second, consistent collection and release of data and information of labor market trends and forecasts to reduce mismatch in the labor market. Third, maintaining closer links to connected policies by different government organizations and agencies.

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Chapter 3

New Growth-Driven Industry Policy and Ecofriendly Automotive Industry Policy under Global Megatrends

New Growth-Driven Industry Policy and Ecofriendly Automotive Industry Policy under Global Megatrends

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Summary

This report examines the global megatrends that are fast approaching, and we begin by reviewing the automotive industry megatrends that respond to the global megatrends. Based on this review, we will see future population growth mainly in developing nations, economic power will shift towards Asia, and we will witness rapid growth in technological improvements and climate change. Consequently, the automotive industry will also transition from developed-nation-specific consumption and developing-nation-specific production patterns to production and consumption mainly by developing nations. Furthermore, the trends in population growth and aging will lead to the use of small and smart automobiles. More important, the constraints of fossil fuels and climate change will result in a rapid transition for the automotive industry, from traditional fossil-fuel-based automobiles to ecofriendly automobiles such as electric and hydrogen vehicles.

Based on these global megatrends, this report analyzes and compares Korea's future industry growth policies to Hungary's policies that aim to increase its share of manufacturing through its reindustrialization plan. Through this process, this report reviews and compares the industrialization strategies of both countries and identifies their policy implications. Additionally, considering the future ecofriendly automobile industry as a specific industry, this report investigates Korea's policies to promote their production and supply. The goal is to recognize the importance of the automotive industry's role in the Hungarian manufacturing sector, to review

and compare the policies that the Hungarian government wants to promote in order to produce and increase the consumption of electric vehicles, and to find relevant policy implications. In particular, upon the Hungarian government's request, this report investigates the policies for promoting the supply of ecofriendly vehicles, such as those promoted by the local governments of Seoul and Jeju.

In the following, we summarize the policy implications of Korea and Hungary's industrial policies and compare the policies for the ecofriendly automotive industries.

It is important to understand how the two countries face different economic environments when implementing new growth-driven industry policies. Until the 1980s, one of the significant ways that Korea achieved rapid economic growth was through government-led export promotion policies combined with very strong domestic protection. However, it is difficult for Hungary to adopt the government-led industrial policies that Korea did. This is because Korea used the industrial policies when it was less exposed to international pressures. Hence, Korea was able to use its independent export-expansion policies as well as promote import-restricting policies to protect domestic corporations and markets.

In Hungary's case, however, its EU membership prevents it from using similar independent industrial policies. It is difficult for Hungary to implement government-led strategic industrial policies. This is because Hungary, as an EU member, should follow the EU's policy direction. Therefore, various industrial policies that contributed to Korea's economic growth cannot be applied to Hungary. For that reason, it is necessary to share with caution policy suggestions in order to apply them to Hungary.

There are several policy recommendations that are based on the comparative studies of new growth-driven industry policies and ecofriendly automotive industry strategies.

First, we recommend maximizing the linkage effects in the automotive industries by combining the policies of the automotive and parts industries. In the automotive industry sectors, there are four multinational companies with domestic SMEs. Therefore, it is necessary to attract more SMEs that are global to provide components to multinationals located in Hungary and export them to international partners. Then, it is necessary to implement policies to promote the international competitiveness of domestic component companies and increase component exports.

Second, we recommend establishing policy strategies on how to combine the

German model with the East Asian model for Hungary's development process. Hungary is in a distinct environment in which it cannot use infant industry protection policies as Korea did. Therefore, Hungary needs to implement an appropriate policy for its automobile industry based on the German model and the East Asian model. The strategic partnership programs that started in 2012 might be expanded.

Third, we recommend implementing policies to develop high-quality human resources. Because of the lack of sufficient financial resources, it is difficult to promote high-quality human resources via direct government investment. Collaboration is suggested between universities and companies, such as national research institutes like KIST and the automotive contract department between academia and automotive companies.

Fourth, investing more aggressively in ecofriendly automobile production is necessary. However, we do not recommend initiating automobile production directly, with the exception of buses, which Hungary already produces. Since there are four multinational automobile companies, it will be useful to attract global SMEs that will provide components to the multinational enterprises located in Hungary and then export their products to the international markets.

Finally, ecofriendly automobile consumption promotion policies should be implemented more extensively. The strategies in the E-mobility Plan include mainly dissemination promotion plans without significant financial support. The plan's tax incentives might not be enough to cover the price difference between fossil-fuel cars and ecofriendly cars.

1. Introduction

The global megatrends suggested by PWC(2014) and KPMG(2014) include a rapid population growth rate in developing countries, economic power shift to emerging economies, urbanization, climate change, and technological breakthroughs. The global megatrends will affect future automotive industries.[24)]

Following the megatrends in general, POSRI(2013) lists three global megatrends in the automotive industry. It indicates that there will be no significant change in engine and steel material technologies, while several of the megatrends described will affect automobile industries in the following three ways.

24) A detailed explanation of the global megatrends is given in the Appendix.

First, the main consumption and production structure will change from production by emerging economies and consumption by developed countries to production and consumption by emerging economies, especially China. By 2025, emerging economies will account for more than 50% of automobile sales. The four countries of the BRIC (Brazil, Russia, India, and China) will be about 45%. Second, due to climate change and, thus, strengthened environment regulation, governments will encourage greener car production. Finally, through aging and urbanization, automobile consumption patterns will shift to small and smart cars and further personal mobility vehicles, which are specialized for short-distance travel (POSRI, 2013, pp.2–3).

Following the global megatrends, Hungary has tried to reindustrialize the economy through new industrial policies. These policies are strongly connected with the EU's reindustrializing policy, with targets to increase the industry share to 20% by 2020 (European Commission, 2014). Based on this EU target, each member country established its own target for the industry share as well as industrial policies. Hungary's target is to increase the industry share from 23% in 2014 to 30% by 2020. One of the main target industries of the reindustrialization strategy is the automobile sector, which accounts for 18% of Hungary's total exports (Nagy, 2015a).

The main objective of this report is to investigate how the Korean government established its new growth-driven industry policies. In detail, Hungary wants to know how Korea planned and implemented the policies on ecofriendly automobiles. For this purpose, the report introduces Korea's new growth-driven industry policies and then selects the automotive industry as a specific target industry, which is also one of the key growth-driven industries in Korea and Hungary.

Considering the stage of Hungary's economic development, we examine Korea's industrial policies after the 1990s,especially the automotive industrial policy, which is required by the Hungarian government. For the automotive industry policy, it is necessary to explore production promotion policies as well as demand promotion policies. With respect to the production side, Hungary faces a quite different business environment from Korea's, so it is critically important to realize this difference and recommend feasible policies.

However, Hungary should use caution in applying the lessons from Korea's experiences directly, because the economic situations of the two countries are different. Korea established industry policies to protect the domestic market to allow domestic companies to obtain international competitiveness in the automotive industry. The government of Korea protected its automotive and components production through high tariffs and import restrictions. As an EU

member, however, Hungary cannot establish a policy that is fully independent of EU policies. Thus, the economic environment that Hungary faces is different from that of Korea, which had relatively autonomous industrial strategies.

This report consists of the following content. First, Korea's new growth-driven industry policies since the 1990s are reviewed, and then we examine the automotive industrial policies that reflect Korea's development experiences. Among the automotive industry policies, our focus is on ecofriendly automotive policies. Finally, we review Jeju and Seoul's practical policies on the promotion of ecofriendly automobiles.

2. New Growth-Driven Industry Policies

2.1. New Growth-Driven Industry Policies in Korea

It is well known that Korea's rapid economic growth was achieved by the seven five-year economic plans, which continued until 1996.[25] However, as the income per capita increased, and, thus, the competitive power of the private sector improved, traditional macro-level economic planning was not effective any longer. Although direct government intervention controlled the private sectors, the interventions had limited effect on the private sector, and, therefore, the government could not achieve its objectives. Thus, the government began establishing industry-level planning called "new growth-driven industry policies" even though specific names varied over time.

Beginning in the 1990s, the Korean government began establishing industry-specific policies rather than the macro-level economic plans, which formally ended by 1996. This reflects a paradigm shift in economic development from a traditional government-led to a market-led development strategy. This shift was reflected by the government visions proclaimed by the respective government regimes, the Knowledge Economy (1998–2003), the Innovation Economy (2003–2008), Green Growth (2008–2013), and the Creative Economy (2013–present) (Kang, 2014).

The new growth-driven industry policies explained later were quite consistent with the government vision over the period, and, further, the industries selected by each government mostly overlapped with the industries selected by later governments. For example, many industries included in the promotion policy of new growth-driven industries (2009–2013)were linked with climate-change-related

25) See Kim and Koh (2010) for a more detailed explanation of Korea's economic planning.

industries, which reflected the green growth vision. <Table 3-1> summarizes the government's visions and its major targets.

〈Table 3-1〉 Overview of Government Vision and Its Major Targets

Period	Vision	Major targets
1998–2003	Knowledge Economy	• Economic reforms: deregulation, institutional transparency, protection of intellectual and intangible assets • Venture capital: IT boom, KOSDAQ market cap jumps from KRW 5.6 trillion (mid-1998) to KRW 45.6 trillion (end1999)
2003–2008	Innovation Economy	• Government innovation: transparent and efficient government through e-government services to better serve the public
2008–2013	Green Growth	• Sustainable growth: reduce greenhouse gas emissions and environmental pollution while creating new growth-driven industries and job opportunities by using green technologies and clean energy
2013–present	Creative Economy	• Creative industries: incorporate imagination and creativity with science, technology, and ICT to create new industries and markets through the nurturing of an entrepreneurial culture

Source: Kang (2014), p.15.

Reflecting different government visions, each government selected its own targeted industries and invested significant amounts of government funds. Namely, there were the Leading Technology Development Project (1992–2002), Development Strategy for New-Generation Growth-Driven Industries (1997–2002), Promotion of Next-Generation Growth-Driven Industries (2003–2007), Promotion of New Growth-Driven Industries (2009–2013), and Future Growth-Driven Industries (2013–present) (Kang, 2014, p.29). <Table 3-2> summarizes the major target sectors under each new growth-driven industry policy.

As <Table 3-2> indicates, even though different governments had different policy strategies and, therefore, different policy titles, many industries were selected quite consistently. For example, there are next-generation cars with different names, ITC-related industries, alternative-energy-related industries, and frontier-technology industries such as biomaterials, nanotechnologies, etc.

〈Table 3-2〉 Overview of New Growth-Driven Industry Policies

Period	Policy	Major targets
1992–2002	Leading Technology Development Project (G7 Project)	New-energy technology, environmental technology, next-generation cars, etc.
1997–2002	Development Strategy for New-Generation Growth-Driven Industries	Biotechnology, nano, environment, culture, space
2003–2007	Promotion of Next-Generation Growth-Driven Industries	Future automobiles, information technology (IT), and next-generation mobile communications
2009–2013	Promotion of New Growth-Driven Industries	Three sectors and 17 new growth-driven industries [green technology (six), high-tech convergence (six), and value-added service (five)]
2014	Future Growth-Driven Industries	Nine strategic industries and four base industries Smart cars, Internet of Things(IoT), big data, etc.

Source: Kang (2014), p.27.

2.1.1. Leading Technology Development Project

The Leading Technology Development Project (1992–2002), also called the G7 Project, aimed to become seventh in the global science and technology ranking by the 2000s (Kang, 2014, p.29). This was the first new industry project. The government intended to achieve the following three objectives through the project: (1) improve economic and social development and quality of life, (2) prepare technological coping mechanisms for the global environment agendas, and (3) achieve international competitiveness and self-confidence (Kang, 2014, p.30).

The project consisted of 18 industries and the development of two technologies: product technology development and base technology development (see <Table 3-3>). The former promoted key industries as growth-driven industries, and the latter improved the quality of life. The former included high-tech-related industries such as high-definition TV(HDTV), integrated service digital network(ISDN), and medical industries such as new drugs, new pesticides, medical engineering, sub-miniature precise machinery, etc. The latter included base-technology-related fields such as semiconductors, nuclear reactors, new functional biomaterials, environmental engineering, etc.

〈Table 3-3〉 Product and Base Technology Development in the G7 Project

Product technology development	Base-technology development
• HDTV • New drugs, new pesticides • Application-specific integrated circuits • Next-generation flat-panel displays • Broadband (ISDN) • Medical engineering • Sub-miniature precise machinery • Next-generation cars • High-speed rail	• Next-generation semiconductors • Next-generation nuclear reactors • Advanced materials for information, electronics, and energy • New functional biomaterials • Development of advanced superconducting Tokamak • Advanced manufacturing systems • Human sensibility ergonomics • Environment engineering • New energy

Source: Kang (2014), p.31.

As a leading technology development project, the G7 Project invested about KRW 3.61 trillion (about USD 3.64 billion) for ten years, which included about KRW 1.60 trillion (about USD 1.61 billion) of public funds and KRW 2.01 trillion of private funds (about USD 2.02 billion) (Central Officials Training Institute, 2006, p.20). <Table 3-4> shows the annual trends in the project's investment plan from 1992 to 2001.

〈Table 3-4〉 Investment Plan for the Leading Technology Development Project

(Unit: KRW 100 million (USD billion))

Year	1992–1997	1998	1999	2000	2001	Total
Public	8,742 (1.07)	2,110 (0.15)	1,873 (0.16)	1,771 (0.16)	1,512 (0.12)	16,008 (1.61)
Private	11,590 (1.42)	2,991 (0.21)	2,325 (0.20)	1,979 (0.17)	1,196 (0.09)	20,081 (2.02)
Total	20,332 (2.48)	5,101 (0.36)	4,198 (0.35)	3,750 (0.33)	2,708 (0.21)	36,089 (3.64)

Note: The conversion from KRW to USD uses an exchange rate of 818.96 for 1992–1997, 1401.44, 1188.81, 1130.96, and 1290.99 for 1998 to 2001, respectively, and 992.60 for the total, which is the annual average exchange rate for the period between 1992 and 2001.

Source: Central Officials Training Institute (2006), p.20; World Bank website (http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=world-development-indicators#), retrieved on April 19, 2014.

2.1.2. 10 Next-Generation Growth-Driven Industries

The 10 Next-Generation Growth-Driven Industries (2003-2007) aimed to achieve USD 20,000 of per capita income and expansion of future growth potential (Kang, 2014, p.32). The plan selected core strategic products and technologies in ten strategic industries <Table 3-5>. This strategy included various new-generation technology-related industries: digital TV/broadcasting, displays, intelligent robots, future automobiles, and next-generation semiconductors. Even though the strategy name was changed, the detailed industry fields were quite consistent, for example, in semiconductors, next-generation automobiles, digital industry, biomedicine, etc.

〈Table 3-5〉 Development Strategy for Next-Generation Growth-Driven Industries (2003–2007)

Industries	Core strategic technologies and products
Digital TV and broadcasting	Broadcast systems, DTVs, DMBs, set-top boxes, and combination devices
Displays	LCD, LED, PDP, OLED, 3D, e-paper, and related materials
Intelligent robots	Domestic service robots, IT-based service robots, robots for hostile environments, medical service robots, artificial intelligence, and related core technologies
Future automobiles	Intelligent cars, ecofriendly cars, and intelligent transport systems
Next-generation semiconductors	Next-generation memories, SoC, nanoelectronics, and related materials
Next-generation mobile communication	4G mobile and systems, telematics, signal processing and analysis technologies, and all-optical communication technologies
Intelligent home networks	Home servers/home gateways, home networking, intelligent information appliances, and ubiquitous computing
Digital content and SW solutions	Production, digital content utilization and distribution systems, cultural content, embedded SW, intelligent total logistic services, and GIS/GPS technologies
Next-generation batteries	Secondary batteries, fuel cells, hydrogen energy, and related materials
New biomedicines and organs	New medicines, bio-organs (cloning, transplants), biochips, medical image diagnosis devices, medical devices for the elderly, elderly disease treatment and brain function, immune function control, intelligent drug delivery systems, gene therapies, and development of new varieties of seeds and useful proteins using genes

Source: Kang (2014), p.33

In the government's total research and development budget, the share is low for research and development related to next-generation growth-driven industries. In 2005, it was KRW 397.7 billion, which was 6% of the total government budget of KRW 6.7 trillion taking into account the special accounting for 2005.

In 2005, the government invested KRW 29.4 billion, 4.2% of the government budget of KRW 704.6 billion, in the biotechnology field. In 2004, KRW 28.4 billion, 4.7% of the government budget of KRW 530.2 billion, was allocated to the new biomedicines and organ industry. As shown above, even though the new biomedicines and organs industry requires huge support from the government, unlike other next-generation growth-driven industries, the investment is not too different from the investment of privately led industries (Choi *et al.,* 2005, p.190).

To promote next-generation growth-driven industries that center on new technologies that currently have no markets, it is very important for the government to propose a vision regarding future industry developments and effectively convey policies that actively cultivate next-generation growth-driven industries and become a vision adopted by private fields and markets. To develop certain industries into leaders of economic growth and, in turn, into growth-driven industries, resources and capabilities throughout society, including human resources, financial resources, and social systems, must be concentrated (Choi *et al.,* 2005, p.190).Therefore, a low budget for a next-generation growth-driven industry is insufficient to create policies that will mobilize the private sector resources and capabilities (Choi *et al.,* 2005, p.190).

2.1.3. New Growth-Driven Industry Comprehensive Promotion Plan

The New Growth-Driven Industry Comprehensive Promotion Plan (2009–2013) reflected a development paradigm shift from the traditional fossil-fuel-based strategies to low-carbon, green growth strategies (Kang, 2012, p.158; 2014, p.17). Confronting the risk of natural resource constraint and climate change, the Korean government initiated "low-carbon, green growth" policies in 2008, which aimed to decrease greenhouse gas emissions by sustaining economic growth (Kang, 2012, p.158).

This strategy consisted of 17 new growth-driven industries in three sectors: green technology industry, high-tech fusion industry, and high-value-added service industry (see <Table 3-6>).

〈Table 3-6〉 Promotion Policies of New Growth-Driven Industry Comprehensive Plan (2009–2013)

Sectors	New growth-driven industries
Green technology industry	New renewable energy, low-carbon energy, water technology (advanced water treatment), LED applications, green transport systems, high-tech green cities
High-tech fusion industry	Media communication fusion, IT fusion systems, robot applications, new materials and nanofusion, biomedicine and medical devices, high-value-added food industry
High-value-added service industry	Global health care, global education services green financing, content and software, MICE, and tourism

Source: Kang (2012), p. 159; Kang (2014), p. 37.

According to the New Growth-Driven Industry Comprehensive Promotion Plan (2009–2013) announced in May 2009 by the Ministry of Knowledge Economy, the government decided to invest KRW 24.5 trillion (based on government expenditures, temporarily) for five years (2009–2013) in 17 new growth-driven industries in three fields (see <Table 3-7>).It was expected that KRW 14.1 trillion would be spent on R&D and KRW 10.4 trillion on non-R&D (financial industries, system improvements, market creation, etc.).During the next five years, KRW 2.1 trillion will be spent on human resource training and KRW 6.0 trillion on small and medium-sized enterprise support for functional support methods.

〈Table 3-7〉 Investment Plan for New Growth-Driven Industry Comprehensive Plan (2009–2013)

(Unit: KRW trillion)

Category		Green technology	Cutting–edge converging industry	High-value-added service industry	Total
Number of projects		79	62	59	200
Budget	R&D	3.7	8.8	1.6	14.1
	Non-R&D	3.0	3.4	3.9	10.4
	Sub-total	6.7	12.2	5.5	24.5

Source: Ministry of Education and Science Technology (2009), p.1.

2.1.4. Future Growth-Driven Industry Plan

The Future Growth-Driven Industry Plan (2014)established its strategy by dividing the industries into the strategic industry, which can establish an independent large-scale industry environment of specific products and services, and the infrastructure industry, which can generate significant synergistic effects through convergence. The nine strategic industries are divided into four sectors: (1) the major industry (smart cars, 5G mobile communication, deep-sea offshore plants), (2) the future new industry (intelligent robots, wearable smart devices, tangible content), (3) the public welfare industry (customized wellness care, disaster safety management smart systems, renewable energy hybrid systems), and (4) the base industries(intelligent semiconductors, convergence materials, intelligent IoT, and big data). <Table 3-8> summarizes the plan's main industries.

〈Table 3-8〉 Summary of Future Growth-Driven Industry Plan

Sector	Industries
Major industries	Smart cars, 5G mobile communications, deep-sea offshore plants
Future new industries	Intelligent robots, wearable smart instruments, tangible content
Public welfare industries	Customized wellness care, disaster safety management smart systems, renewable hybrid systems
Base industries (platform)	Intelligent semiconductors, convergence materials, intelligent IoT, big data

Source: Joint Work of Related Ministries(2014), pp. 2–3.

The budget for the new industry and market creation was allotted from the 2015 government budget. The following budgets are allocated for promoting the Smart Challenge Project, which commercializes and applies fully developed ICT technology to existing industries (new, KRW 38.7 billion):(1)establish, apply, and demonstrate a new energy supply model by testing the Fusion of New Renewable Energy and Energy Storage System in island areas (KRW 8.0 billion), (2) support for creating world-class products by developing new biomedicines such as next-generation medical equipment and stem-cell medicine (new, KRW 26.6 billion), and (3) increased discovery and support for business models in new Internet industry fields with high growth potential such as the Internet of Things (KRW 31.1 billion) (Ministry of Strategy and Finance, 2015, pp.70–71).

In 2015, in order to promote the implementation plan for new growth-driven industries effectively, the plan to connect the budgeting for the National Research

and Development Projects with the implementation plan was announced. For this purpose, in April 2014, new growth-driven industries were selected for targeted investment in the "2015 Investment Direction and Standards for National Research and Development" (Joint Work of Related Ministries, 2014, p.16).

2.2. Revival of Industrial Policies in Hungary[26)]

Reindustrialization by increasing the share of manufacturing from 23% in 2014 to 30% by 2020 was a key agenda item of the new Hungarian government beginning in April 2014 (Nagy, 2015a, p.1). This policy is quite consistent with the reindustrializing Europe agenda by the European Commission, called the A Europe Initiative (European Commission, 2014).

Through reindustrialization, the government intends to achieve the following six targets:

1) Job creation through an increase in the employment ratio
2) Innovation through higher-value-added production and education
3) Sustainability through long-term economic growth
4) Energy-effective production through decreasing the long-term costs of production
5) Regional equalization through support of the less-developed regions
6) Export orientation through increasing export production and growing competitiveness of SMEs

The government selected several major industries as the center of the reindustrialization process: automotive industry, electronic industry, health industry, logistics, food industry, and tourism.

1) The automotive industry is a core industry that generated almost 18% of total exports in 2014, and total production increased 20% compared to 2013.
2) The electronic industry is one of the largest industrial sectors, accounting for 22% of total manufacturing production in 2014.
3) The food processing industry remains one of the most important sectors by employing 147,000 people in 2014, and it is the second largest producing sector with 10% of total production and generating 6% of total exports.
4) The pharmaceutical industry is one of the most efficient and successful sectors in Hungary employing more than 14,000 people, and it had 3% production growth in 2014 compared to 2013.

26) This section is mainly based on Nagy (2015a; 2015c).

In order to revive industrial sectors, Lux (2015, p.16) suggests the combination of two representative policy strategies: the German model and the East Asian Model. The German model is a multinational enterprise-based model, where a host country provides skilled labor. Through linkage effects between multinational and local companies, the host country achieves strong export performance with a budget surplus. However, the East Asian model, also called the developmental state model, is based on strong government intervention in industrial development with industry-friendly fundamentals, investment in skilled labor, foreign direct investment, and a domestic enterprise network.

In addition, Lux (2015, p.17) suggests industry-friendly structural reforms due to weak domestic capital, external dependency, and slowing FDI flows in Hungary. Further, he suggests additional factors for revival of industrial policies: (1) medium-skilled jobs and activities, (2) strong upgrading in competitive branches, increasing factor intensity, (3) slowly emerging supplier networks, (4) a low but increasing number of domestic medium-sized companies, and (5) knowledge and innovation transfer.

As summarized in Sec. 2, Korea continued carrying out economic planning and new industrial policy to promote new growth-driven industries. Furthermore, the economic plans were successful through a combination of export promotion and import substitution policies.[27)]

3. Ecofriendly Automotive Industry Policies

3.1. Automotive Industry Policies in Korea

The automotive industry policy in Korea can be characterized by strong government protection and promotion policies combined with risk-taking private companies (Ministry of Strategy and Finance and KIET, 2014, p.15).

The government automotive policy can be summarized as follows.[28)] Beginning in the 1960s, the Korean government fostered the automotive industry as part of the heavy chemical industry.[29)] Automotive industry promotion policies can be classified as production promotion and consumption promotion. Production promotion includes government R&D investment, import protection of foreign cars and/or

27) See Koh (2010) for a more extensive explanation of the economic development process.
28) See Ministry of Strategy and Finance and KIET (2014) for extensive overview of the Korean automotive policies since the 1960s.

components, and export promotion of cars and/or components. Until the 1980s, in Korea it was well recognized that export promotion policies were combined with import protection of foreign cars and components. In the early 1980s, the special consumption taxes were continuously decreased in order to increase the demand for automobiles. Simultaneously, the gradual decrease in import tariffs led to opening the market to foreign automobiles.

The automotive policies can be categorized as automobile production promotion, component localization, demand promotion, and protection of the domestic automotive industry from foreign competitors.[30)]

First, the Korean government was quite eager to produce automobiles from the beginning of economic development in the 1960s. In the 1960s, the government intended to promote and protect domestic production of automobiles through integration, and in the 1980s, through rationalization of automobile companies. <Table 3-9> summarizes the main policies and their strategies.

In 1962, the government established the Automotive Industry Five-Year Plan with assembly production by the knockdown assembly method and produced the first car branded "Sibal." In 1973 and 1974, the government established two production promotion plans: the Automotive Industry Promotion Plan and the Long-Term Automotive Industry Promotion Plan. They intended to produce and export automobiles that are more sophisticated beyond the knockdown type and to simultaneously localize component industries more. In 1975, the first Korean automobile model, Pony, was produced. Facing the global economic crisis and too much investment in the automobile industries, the government initiated rationalization policies in the automotive sectors. This strategy intended to lead to a specialized production system by structural adjustments among enterprises and car models. From the 2000s, the government began establishing next-generation cars that were followed by the global megatrend of tackling climate change, as discussed in the next sub-section.

29) In 1973, the government of Korea announced that they would develop heavy chemical industries focusing on the steel, chemicals, nonferrous metals, machinery, shipbuilding, and electronics industries. Through this policy, the industrial structure significantly changed from a high ratio of primary industries to a high ratio of manufacturing. Through strong government intervention, Korea followed a market-oriented development paradigm. See Ministry of Strategy and Finance and Korea University (2014, p.20) for more details. Selecting the heavy chemical industry as a strategic sector in the beginning of economic development is one of the main characteristics of Korea's economic development process, which is in contrast to the recent development plans of low- and medium-income countries.

30) These four policy categories cannot be applied to Hungary as a EU member because Hungary cannot protect domestic companies with its own protection strategies such as tariffs. Thus, this report focuses on production and promotion strategies rather than specific protection through tariffs or enforced localization to domestic or multinational companies.

〈Table 3-9〉 Selected Automotive Production Promotion Policies

Year	Policy	Main strategies
1962	Automotive Industry Five-Year Plan	- Assembly production - Comprehensive promotion plan for automotive industry - Knockdown assembly method (produced Sibal as a first car brand)
1973	Automotive Industry Promotion Plan	- Target: produce 500,000cars in the beginning of the 1980s - Plan to significantly increase localization rate by developing own model
1974	Long-Term Automotive Industry Promotion Plan	- Export automobiles beyond knockdown assembly
1975	Independent Domestic Production (Pony)	- The first Korean model production (Pony) - Comprehensive automobile factory that can produce 50,000 cars per year - Become an export sector
1980	Automobile Industry Rationalization Measures	- Specialized production system by structural adjustment among enterprises and car models
2003	Future Automobiles (10 Next-Generation Growth–Driven Industries)	- Develop next-generation cars (ecofriendly automobiles)
2010	Green Car Development Roadmap	- Become fourth in green car technology - Provide various incentives for electric car purchases beginning in2012

Source: Ministry of Strategy and Finance and KIET(2014), pp.20-49;Ministry of Knowledge Economy *et al*. (2010), p.1.

Second, the government tried maximizing automobile component localization through import protection and protecting domestic component industries from foreign capitals. Thus, the automobile and parts industries were jointly promoted through a combination of export promotions and import restrictions of components that were locally produced. In particular, the government continued to localize components with more domestic ownership.

The industrial policies for the automobile industry prevented the entry of foreign firms into the domestic market by protecting domestic automobile producers through export promotion and import control policies. These policies continued until 1987, and the import control for finished vehicles was very strong. <Table 3-10> summarizes the various localization policies since the 1960s.[31)]

〈Table 3-10〉 Selected Component Production Promotion Policies

Year	Policy	Main strategies
1965	Localization Five-Year Plan	- Achieve complete localization of automobile components
1969	Basic Plan for Automotive Industry Promotion (Three-Year Localization Plan) - Localization Targets by Component	- Set up localization targets by component
1974	Long-Term Automotive Industry Promotion Plan	- Enlarge and specialize by detailed component
1980s	Policies by Function Rather than Industries under the Name of the Parts and Materials Industry	- SME promotion policies - Achieve localization of automobile components through localization policy of machinery, parts, and materials

Source: Ministry of Strategy and Finance and KIET(2014), pp. 63–64.

Third, the automobile production and localization of components were promoted through strong protection of domestic automotive sectors by regulating automobile imports until the end of the 1980s. Protecting components from foreign capital until the mass production and exports were achieved in the 1980s and limiting foreign investment to promote domestic automobile production kept the ownership of a domestic company. At the same time, in order to promote the domestic parts and materials industry, the government controlled the parts and materials imports that were produced domestically.

In order to protect the domestic automobile and component industry, the government restricted automobile imports and protected the component industries from foreign capitals until the end of the 1980s. In 1987, the government completely liberalized automobile imports except for cars under 2,000cc,and the tariff rates were reduced from 30% in 1988 to 20% and 17% in 1990 and 1991, respectively. They decreased further to 15% in 1993 and 10% in 1994, and the tariff was reduced to 8% due to the Korea-US FTA in 1995(Ministry of Strategy and Finance and KIET, 2014, pp.47–48).

Last, in order to promote domestic automobile demand, the government decreased the special consumption tax starting in 1987, at which time it was decreased from 15% to 10% for small cars under 1,500cc. Further, in 1988 it decreased from 20% to 10% for cars between 1,500 and 2,000cc.

31) Since 1980s, the automotive policies have been established by function rather than industry under the name of the parts and materials industry.

Through continuous and consistent support for automotive production and localization of components as an aggressive industrial policy by the central government, Korea made significant achievements in automotive production as well as localization of components.

<Table 3-11> shows the automobile unit production and ratio of the global ten automobile producing countries. The number of automobiles produced in Korea increased from 2,818,000 in 1997 to 3,699,000 and 4,521,000 in 2005 and 2013, respectively. However, its share remained almost the same, around 5.2%, in terms of the global production share. The U.S. ranked first in 1997, but China became first in global production in 2013. This is a significant improvement in the automotive industry after Korea made the Sibal brand as a knockdown type in 1962 and the Pony as the first Korean model in 1975.

However, the target for component localization was not achieved by the schedule planned in the 1960s. This is mainly because the government targeted rapid economic growth through automobile exports. Therefore, component localization was delayed until the domestic component industries achieved international competitiveness. For example, in 1965, the government established a plan to achieve 100% localization of components for five years, but this was not achieved mainly because the Shinjin preferred the knockdown type of production for new models (Ministry of Strategy and Finance and KIET, 2014, p.30). However, a significant increase in automobile exports and the competitive promotion of the domestic components industry led to the promotion of the component industry's international competitiveness, higher localization, and increased exports.[32)]

32) See Ministry of Strategy and Finance and KIET (2015) for more details on localization policy and its performance of component sectors.

〈Table 3-11〉 Global 10 Automobile Production Countries

(Unit: 1,000 (%))

	1997		2005		2013	
1	U.S.	12,130 (22.8)	U.S.	11,947 (17.8)	China	22,117 (25.3)
2	Japan	10,975 (20.7)	Japan	10,800 (16.1)	U.S.	11,046 (12.6)
3	Germany	5,022(9.5)	Germany	5,758 (8.6)	Japan	9,630 (11.0)
4	Korea	2,818(5.3)	China	5,701 (8.5)	Germany	5,865 (6.7)
5	France	2,579(4.9)	Korea	3,699 (5.5)	Korea	4,521 (5.2)
6	Spain	2,562(4.8)	France	3,549 (5.3)	India	3,896 (4.5)
7	Canada	2,256(4.2)	Spain	2,764 (4.1)	Brazil	3,740 (4.3)
8	Brazil	2,069(3.9)	Canada	2,688 (4.0)	Mexico	3,052 (3.5)
9	UK	1,935(3.6)	Brazil	2,528 (3.8)	Thailand	2,457 (2.8)
10	Italy	1,827(3.4)	UK	1,803 (2.7)	Canada	2,380 (2.7)
Total		53,116(100)		67,204(100)		87,377 (100)

Source: OICA Production Statistics (http://www.oica.net/category/production-statistics) retrieved on May 23, 2015; Ministry of Strategy and Finance and KIET (2014),p.22.

<Table 3-12a> and <Table 3-12b> summarize Korea's automotive industrial policies since 1992. They include the automotive production promotion and component localization on the supply side and domestic consumption promotion on the demand side. The government continued protecting domestic production until the end of the 1980s (Ministry of Strategy and Finance and KIET, 2015, p.113).

〈Table 3-12〉 Comparative Study of Automobile Industry Policies

Category		1992–94	1995–97
Technology development stage		Learn core technology	Individual technology development
Independent model automotive development		Small and medium-size cars (jeeps)	Full-size cars (commercial)
Parts	Engine	Establish planning and testing technology (lean-burn engine)	Low-pollution engine (alternative engine)
	Transmission	Low-noise transmission	Auto transmission
	Chassis	Establish system planning technology	Electric-control chassis system
	Car body	Establish system planning technology	Optimize car body planning
	Electronic devices	Sensor and electronic control unit	Complex wire device, solid-type instrument, warning information system
	Safety devices	Passive seat belt	Air bag
Category		**1998–2000**	**2001-2014**
Technology development stage		Application technology development	Future new technology development
Independent model automotive development		Electric cars	Future cars
Parts	Engine	High-performance engine(ceramic engine)	Future engine(Stirling engine)
	Transmission	Continuously variable transmission	New technology application of electric control
	Chassis	High-performance chassis system of electric control	Comprehensive control of chassis system
	Car body	New material application car body, car body group service technology	Highly safe car body
	Electronic devices	External information system	High-level information system
	Safety devices	Collision avoidance system, system to keep distance between cars	Automatic operation system

Source: Ministry of Strategy and Finance, and KIET (2014), p.113.

3.2. Automotive Industry Policies in Hungary

As a main growth-driven industry, Hungary's automotive industry achieved EUR 18 billion (about USD 23 billion) in sales, which accounts for 18% of the manufacturing production, 10% of GDP, and 18% of total exports. Furthermore, 94% of the automobile production (165,000) and 88% of the component production were exported. The major export partners in the EU are Germany (39%), Italy (7%), Romania (5%), Austria (5%), UK (4%), and France (4%). The export share for the non-EU countries was 14%.[33)]

There are four automobile multinational companies in Hungary (Mercedes Benz, Suzuki, Audi, and Opel). The automobile production in 2013 was 161,000 (Suzuki), 108,000 (Mercedes Benz), and 43,000 (Audi). Additionally, there are well-developed component industries. Since 2010, 14 out of 20 global automobile component companies have been located in Hungary. Since 88% of component production is exported, it is well known that the component industries in addition to the automobile sectors are internationally competitive. The representative component companies are Hankook Tire, Audi, Bosch, Continental, Delphi-Calsonic, Denso, GM-Opel Powertrain, Rava, Valeo, and Visteon.[34)] The R&D centers of about 20 global automobile companies such as Audi and Bosch are located in Hungary.

As of 2013, there were about 712 automobile and component companies with approximately 116,000 employees in Hungary. The four major automobile companies have approximately 17,000 employees.

There are several reasons why global companies should invest in Hungary.

First, the Hungarian government is very committed to streamlining business processes and increasing the competitiveness of both SMEs and large enterprises in its country. Both refundable and nonrefundable incentives are available to investors coming to or expanding in Hungary. The regulations on incentive opportunities must be in accordance with EU rules (Nagy, 2015c, p.8).

33) This section is summarized by reviewing the materials written by the Hungarian consultant, Dr. Ádám Nagy (2015a, 2015c) and several website documents:hun.mofat.go.kr/webmodule/htsboard/template/read/korboardread.jsp?typeID=15&boardid=3675&seqno=901214&tableName=TYPE_LEGATION and http://hun.mofa.go.kr/webmodule/htsboard/template/read/korboardread.jsp?typeID=15&boardid=3675&seqno=1050597&c=&t=&pagenum=1&tableName=TYPE_LEGATION&pc=&dc=&wc=&lu=&vu=&iu=&du= retrieved on May 18, 2015.

34) Audi produces engines, Bosch produces component systems such as brakes, and Continental produces sensor equipment. Hankook located in Dunaujvaros hires about 810 people per year at its 10-million-tire-production facility (The Export-Import Bank of Korea, 2010).

Second, Hungary has relatively cheap but very capable, highly skilled labors.[35] FDI in Hungary is attracted because of the high-quality labor in the major industries such as the IT, pharmaceuticals, and professional services sectors. Around two-thirds of the workforce in Hungary has completed a secondary, technical, or vocational education(Nagy, 2015c, p.8).For example, about 100,000 laborers who are well trained at universities or technology-oriented high schools work in the automotive industry.

Third, Hungary as the center of Europe is the center of transport, logistics, and manufacturing. Even companies that have no factories in Hungary operate distribution centers there.

Fourth, there is strong link among excellent global component production companies, which leads global automobile companies to invest in Hungary.

Finally, due to technological traditions with renowned scientists and innovators, there is an increasing trend for global companies to locate their R&D centers in Hungary. For example, Dr. Anyos Jedlik developed the world's first electric engine in 1828, and Joszsef Galamb developed the Ford Model t-type production line (1913). Most notably, Ferenc Pavlics is known as a developer of the NASA Apollo Lunar Roving Vehicle. Furthermore, Nagy(2015c, p.9) mentions Hungary's additional competitive advantages of industrial parks, science parks, low labor costs, various governmental incentives (cash subsidies, tax allowances), investment-friendly economic policy, competitive tax system, financial and fiscal stability, and success in reducing public debt.

3.3. Ecofriendly Automotive Industry Policies in Korea

This section reviews the ecofriendly automotive policies in Korea.[36] As Chap. 2 summarizes, the Korean government has continued establishing industrial policies to promote the production of ecofriendly automobiles even though the specific terms used changed from next-generation cars, ecofriendly cars, intelligent cars, green cars, and finally, to smart cars.

35) The average wages in Hungary are ca. 60% less than the average of the EU 27, which makes the Hungarian workforce highly competitive. High English proficiency (90% of students speak English) and a high number of work hours per year make Hungarians a highly efficient workforce (Nagy, 2015c, p.8).

36) In this report, ecofriendly cars include plug-in electric vehicles (PHEVs), hybrid electric vehicles (HEVs), electric vehicles (EVs), fuel-cell electric vehicles (FCEVs), and compressed-natural-gas (CNG) vehicles.

3.3.1. Production Promotion Policy

The promotion policies for ecofriendly automobiles are classified as production promotion with a localization strategy of the component industry and demand promotion for domestic and foreign automobiles.

The production promotion policy was already implemented in the leading technology development plan in 1992, but this policy was more at the technology level rather than the industry level. The component localization policy was implemented in the beginning of economic development in the 1960s, as we discussed in the previous section. Further demand promotion policies for ecofriendly automobiles were implemented beginning in2012. Here, we review the production promotion policies by the new growth-driven industry policies described previously.[37)]

3.3.1.1. Leading Technology Development Projects (G7 Project)

The G7 Project divided the main targets into product technology development and base technology development. The production promotion in the automobile sector, which is part of product technology development, was undertaken with the name "Next-Generation Car Development Projects" (The Central Officials Training Institute, 2006, pp.5–6).

The project was composed of three parts: low pollution, safety, and electric cars. The government invested KRW 220 billion over ten years, and the private sectors invested KRW 230 billion. Korea began showing development performance in hybrid cars through the G7 Project (Cho, 2007, p.27).

<Table 3-13> summarizes the period, investment amounts, and participating agencies of the Next-Generation Car Development Projects, and <Table 3-14> shows the performance of the automobile production companies' projects.

By investing KRW 220 billion in the public and private sectors, the government aimed to achieve low pollution and safety by 2001 through the Next-Generation Car Project. Additionally, in 1996, Asia Motors developed a trial parallel-type hybrid bus with an automatic transmission. Hyundai Motors developed the trial Avante car in 1999, and in 2000 they developed the trial Verna car, trial County minibus,

37) Because of the lack of performance data and policy evaluation, it is unfortunate for reviewers to evaluate the performance of each production promotion policy. Or, it can be said that it is too early to evaluate the performance of the policies because technology development is now in process, and, therefore, the government needs to invest more with the expectation of future performance.

and series-type straight hybrid bus with a diesel engine. In 2001 and 2004, Hyundai Motors developed the Click hybrid and conducted a trial run of the Click car, respectively.

〈Table 3-13〉 Main Content of the Next-Generation Car Project

	Project content
Targets	Low pollution and safety by 2001
Period	1992–2001
Investment	Government, KRW 220 billion KRW; private, KEW 230 billion
Participating institutions	46 corporations, academies, and research institutes
Government agency	Ministry of Commerce, Industry and Energy (Ministry of Science and Technology)

Source: The Central Officials Training Institute (2006), p.6; Cho (2007), p.27.

〈Table 3-14〉 Project Performance of Next-Generation Car Development

Year	Company	Development content
1996	Asia Motors	Development of a trial parallel-type hybrid bus with an automatic transmission
1999	Hyundai Motors	Development of a trial Avante car
2000	Hyundai Motors	- Development of a trial Verna car - Development of a trial County minibus - Development of a series-type straight hybrid bus with diesel engine • 1,500cc diesel engine + 50kW generator • Maximum speed: 80km/h
2001	Hyundai Motors	Development of a trial Click hybrid • 1,600cc gasoline engine + 12kW motor + CVT • Maximum speed: 188km/h
2004	Hyundai Motors	• Trial run of a Click car

Source: Cho (2007), p.28.

3.3.1.2. 10 Next-Generation Growth-Driven Industry Project

Under the 10 Next-Generation Growth-Driven Industry Project, an intelligent fuel-cell (hybrid) car was chosen as an item for the next-generation growth-driven industries. The Korean government considered the automobile industry to be

entering a mature stage. Therefore, the government suggested the automobile sector as a growth-driven industry because it has the comparative advantage of developing new technologies (Choi *et al.,* 2005, pp.5–6).

3.3.1.3. Green Car Development Roadmap

The representative government policy on ecofriendly automobiles was the Green Car Development Roadmap in 2010 for 2011–2015. As <Table 3-15> indicates, for example, the plan aimed to produce 1.2 million cars and export 700,000 in 2015. Furthermore, the plan targeted a 21% domestic market share of green cars in 2015, thus, reducing greenhouse gases by 3.3 million tons. In order to achieve these targets, the government planned to invest KRW 3.1 trillion by 2015 (Ministry of Knowledge Economy *et al.,* 2010, pp.1–2).

〈Table 3-15〉 Targets of the Green Car Development Roadmap

Strategy	Category	Targets			
Production	Year	2011	2013	2015	2020
	Domestic production (10,000 cars)	90	100	120	190
	Exports(10,000 cars)	70	80	90	130
Supply	Year	2011	2013	2015	2020
	Market share of green cars (%)	14	17	21	43
	Greenhouse gas reduction (million tons, cumulative)	0.3	1.3	3.3	18
Investment	Year	2006–2010		2011–2015	
	Public investment(KRW trillion)	1.0		1.7	
	Private investment(KRW trillion)	1.3		3.1	
	Total (KRW trillion)	1.4		4.8	

Source: Ministry of Knowledge Economy *et al.* (2010), p.11.

This strategy offered four sub-strategies and established detailed plans for each: (1) Green Car Production Roadmap, (2) Development of Eight Principal Components, (3) Plan for Supply of Green Cars, and (4) Expansion of Infrastructure for Recharging(see <Table 3-16>) (Ministry of Knowledge Economy *et al.,* 2010, p.11).

The targets for the Green Car Development are EVs, PHEVs, HEVs, FCEVs, and CDVs covering a wide range of vehicles such as small, sub-compact, mid-sized, and full-sized in each vehicle type. Development of each vehicle is currently in progress or will soon begin, and production took place in stages starting in 2011. In response to this production plan, the finished car industry, which includes Hyundai Kia, Renault Samsung, and GM Daewoo, sought to establish production facilities for electric vehicles and build new production lines, while the component industry started increasing investment in research, development, and facilities (Ministry of Knowledge Economy *et al.,* 2010, pp.12,14).

〈Table 3-16〉 Production Targets for Green Car

Vehicle type		Development began	2011	2012
EVs	Small	2010	Mass production	
	Sub-compact SUV	2011	Completed development	Mass production
	Mid-sized	2011	Development begins	
	Mid-sized	2012	Review	Development begins
	Bus	2010		
PHEVs	Mid-sized	2008	Completed development	Demonstration
PHEVs	Mid-sized	2000	Completed development (2009) Mass production (2010–)	
	Mid-sized	2006	Completed development (2010) Mass production (2011–)	
FCEVs	Car	2004	Completed development	Test
	Bus	2006	Development in progress	
CDVs	Mid-sized	2010	Completed development	Mass production
	Full-sized	2012		Development begins
	Bus	2013		

〈Table 3-16〉 continued

Vehicle type		2013	2014	2015
EVs	Small			
	Sub-compact SUV			
	Mid-sized	Completed development	Mass production	
	Mid-sized	Completed development	Mass production	
	Bus	Completed development		Demonstration mass production
PHEVs	Mid-sized	Mass production		
PHEVs	Mid-sized	Completed development (2009) Mass production (2010–)		
	Mid-sized	Completed Development (2010) Mass production (2011–)		
FCEVs	Car	Test		Mass production
	Bus	Development in progress		Test, mass production
CDVs	Mid-sized			
	Full-sized	Completed development	Mass production	
	Bus	Development begins	Completed development	Mass production

Source: Ministry of Knowledge Economy *et al.* (2010), p.12.

<Table 3-17> shows the green car production plan by vehicle type and component. The Roadmap for Production of Green Cars includes plans to develop green finished car and support for production systems of all ecofriendly vehicles types (EVs, PHEVs, HEVs, PCEVs, and CDVs). In addition, the Development of Eight Principal Components includes development of original technology for EVs and support for domestic production and improved efficiency in the areas of motors, heating and air conditioning, weight reduction, batteries, chargers, transmissions and transfers, stacks, and preprocessing and filtering. The demand incentives for production promotion support are subsidies, tax support, and establishment of infrastructure for recharging, which includes supply of electric and hydrogen chargers.

〈Table 3-17〉 Targets of the Four Strategies for Green Car Industry Development

Strategy	Content	Target
Green Car Production Roadmap	- Develop green finished car - Support for production system in the industry	- Vehicle types: EVs, PHEVs, HEVs, PCEVs, CDVs
Development of Eight Principal Components	- Develop original technology for EVs - Support for domestic production and efficiency enhancement	- Eight main components: motors, heating and air conditioning, weight reduction, batteries, chargers, transmissions and transfers, stacks, preprocessing and filtering
Plan for Supply of Green Cars	- Subsidies, tax support - Establish infrastructure for recharging	- Includes vehicles for production and operation
Expansion of Infrastructure for Recharging	- Maintenance of green car system - Establish environment for green cars	Supply of electric and hydrogen chargers

Source: Ministry of Knowledge Economy *et al*. (2010), pp.11, 17.

3.3.1.4. Smart Car Plan

In 2014, the government announced the Smart Car Production Promotion Strategy as a future growth-driven industry (see <Table 3-18>). In order to be ranked third in the global smart car industry, the strategy aimed to secure independent techniques of core components, ICT-based transport service construction, and revitalize transport service based on users. This plan began in 2014, and it will be carried out in three stages until 2020.Itincludesa roadmap for technological development and product development for each period. The roadmaps include technological development, market creation, and SME fostering (Joint Work of Related Ministries, 2014, p.6).

〈Table 3-18〉 Implementation Plan for Future Growth-Driven Industries: Smart Cars

Category	Content						
Objective	To be ranked third in the global smart car industry						
Strategy	- Procure independent technologies for core components → Establish infrastructure for ICT-based transport services → Vitalize the user-friendly transport service industry - R&D: Autonomous driving on vehicle-only roads, ICT-based transport service, and development of core technologies for vehicle platooning - Market creation: Frequency allocation for vehicle communication, improvement of legal system - SMEs: Support for ICT SMEs to expand into the automobile industry						
Roadmap for each stage	Stage 1		Stage 2		Stage 3		
	2014	2015	2016	2017	2018	2019	2020
	Develop modules, components and core elements related to NCAP Promote global component producers						
	Vitalize industrial convergence through operation of new biz support Group for automobile-IT convergence						
	Discover transport product and service for demand-centered ICT convergence and integration		Develop core technologies for autonomous driving, service, and BM		Realize vehicle platooning and support for autonomous driving		
	Test autonomous driving and develop license standards		Core safety technologies and prepare standards and system for commercialization		Autonomous driving and vehicle platooning safety and prepare standards to expand supply		

Source: Joint Work of Related Ministries (2014), pp. 6–7.

In addition, the government presented the "Plan to Promote the Market to Expand Supply of Electric Cars and Create Jobs" in December 2014. This plan included investment of KRW 22.2 billion from 2014 to 2020 for research and development of core components for improving the travel distance of electric cars. The plan also promotes the supply of electric cars by expanding the car-charging facilities and operating battery-leasing businesses (Office for Government Coordination and Prime Minister's Secretariat, press release on December 19, 2014, pp.2,9–10).

3.3.2. Dissemination Promotion Policy

As described above, the Korean government continued promoting the production of ecofriendly automobiles as a part of new growth-driven industries. However, due to the high production cost, it is not possible to compete with fossil-fuel automobiles. To support production, the government implemented demand promotion policies using various subsidies, tax subsidies, and incentives.

In order to popularize environment-friendly cars, the Ministry of Environment reinforces financial support (subsidies, tax reduction, etc.) and increased operational incentives (parking fee reduction in public parking lots, congestion fee reduction, etc.) in order to decrease the price differential between environment-friendly cars and internal-combustion vehicles. Moreover, the Ministry plans to promote a supply strategy for each type of vehicle by reinforcing the supply policies for environment-friendly cars. The biggest obstacle yet is the fact that ecofriendly vehicles are more expensive than traditional vehicles with internal combustion engines, but the government plans to deal with the price differential by offering various benefits such as financial support for purchases and tax reductions (Ministry of Environment, 2014, p.11).

<Table 3-19> summarizes the various demand promotion strategies by automobile type.

〈Table 3-19〉 Tailored Dissemination Strategy Responding to the Market Changes

Types	Current conditions	Dissemination strategy
HEVs (current version)	Various vehicles, reduced fuel cost, competitive price	Dissemination based on market competition and consumer preferences, subsidy provision with tax reduction
EVs (current + near-future version)	Improved price competitiveness (reduced battery cost), expansion of models	Support vehicles before securing market competitiveness, support charging facility installations
FCEVs (future version)	Next-generation ecofriendly vehicles, first production in Korea (2013)	Support preoccupancy of world market, pilot supply mainly in public sector (500 vehicles in 2000)
CNG vehicles (upgraded version)	Mainly support for general CNG buses, pilot supply of ecofriendly and fuel-efficient CNG hybrid buses	Changes in dissemination policies more focused on CNG hybrid buses and garbage trucks (since 2015)

Source: Ministry of Environment (2014), p.10.

To establish the initial market for hybrid cars, the government provided subsidies of KRW 14–28 million per vehicle in the public sector from 2004 to 2008 and changed the incentive for tax reduction in 2009.Yet, the hybrid vehicle sales were low (2%–3% of new car sales), so the government plans to provide subsidies for small and medium hybrid cars with greenhouse gas emissions below 100g/km. Additionally, through tax reductions of up to KRW 3.1 million, the government intends to prepare conditions for establishing a market infrastructure that can survive by itself with a market share of 15%–20% (Ministry of Environment, 2014, p.11).

Electric vehicles are expensive, priced between KRW 30.5 and 60.9 million, and it is difficult to promote their usage without government subsidies. Hence, the government has provided subsidies of KRW 10.5 million per vehicle since 2011 (as of 2014).The government also aims to increase the number of electric cars to 200,000 by 2020 by enhancing accessibility of the private sector with tax incentives such as additional support for local taxes (KRW 3–8 million KRW) and reductions in the individual consumption tax (up to KRW 4.2 million) (Ministry of Environment, 2014, pp.12–13).

For CNG vehicles, the government's supply project has been providing subsidies of KRW 6–20 million per vehicle since 2000 in order to replace diesel buses that emit a large quantity of exhaust gas. As a result, 88% of intracity buses were replaced with natural gas buses, and the urban air quality greatly improved. The accumulated decrease in the pollutant emissions went from 11,640 tons in 2011 to 13,833 tons in 2013(Ministry of Environment, 2014, pp.12–13).

In addition, in order to increase the number of public charging facilities, the government planned to increase the number of public charging facilities from 177 in June 2014 to 1,600 by 2020. The 177 public charging facilities include 77 public institutions, 11 parking lots, 56 large supermarkets, six expressway rest areas, and 27 miscellaneous facilities. The hydrogen fuel-cell electric vehicle is expensive, so the government provides subsidies of KRW 60 million per vehicle for the public sector, which includes local governments and public institutions. The government also plans to expand the supply of FCEVs by providing incentives such as tax reductions and transitioning to a private-oriented supply project when the commercializing of FCEVs becomes feasible and the price stabilizes (Ministry of Environment, 2014, pp.12–13).

In 2015, the government increased the budget again to expand the supply of environment-friendly cars. <Table 3-20> summarizes the financial support for ecofriendly automobile purchases.

The total budget in 2015 for the 34,417 environment-friendly cars is KRW 130 billion (an increase of KRW 74.3 billion compared to the previous year). The budget for the 30,000 hybrid cars is KRW 30.4 billion and KRW 78.8 billion for the 3,000 electric cars (KRW 10.5 million for vehicles and KRW 7 million for slow chargers), KRW 2 billion for the 72 hydrogen fuel-cell cars (KRW 27.5 million in government expenditures), and KRW 18.9 billion for the 1,345 natural gas cars (KRW 6 million for CNGs, KRW 20 million for CNG HEVs, government expenditures) (Ministry of Environment, 2015, p.6).

HEV subsidies are provided for small and medium hybrid cars with CO2 emissions below 97g/km in order to reduce greenhouse gas emissions and promote the consumer culture for environment-friendly cars. Beginning January 1, 2015, KRW 1 million was provided to consumers who purchased the vehicles eligible for the subsidies. The PHEV, which is operated with the electric energy provided by external electricity sources, is categorized as a hybrid car, yet there are no designated vehicles currently (during the first half of 2015, Hyundai released its PHEV Sonata)(Ministry of Environment, 2015, pp.1, 4).

In addition, EVs and HEVs are supported by government subsidies and tax reductions, provided they are designated as "environment-friendly cars" according to the Environment-Friendly Automobile Law. During the current year, the government will consider plans to establish the standards for subsidies and its amount for PHEVs based on case studies of other countries and consultation with experts and producers(Ministry of Environment, 2015, p.24).

〈Table 3-20〉 Financial Support for Ecofriendly Automobile Purchases

Type of vehicles	Current status of support		Domestic vehicles
	Subsidies	Tax Reduction	
HEVs	National subsidies Of KRW 1 million(support provided for vehicles with CO2 emissions below 97g/km since 2015)	Maximum of KRW 3.1 million	Five vehicles: Sonata 2.0, Prius 1.8, etc.
EVs	National subsidies (KRW 15 million)	Maximum of KRW 4.2 million	Five vehicles: Ray, Spark, Soul, SM3, i3
PHEVs		Maximum of KRW 3.1 million(classified as hybrid vehicle)	No designated vehicle

Source: Ministry of Environment (2015), p.24.

3.4. Ecofriendly Automobile Industry Policies in Hungary[39)]

The vision of the Hungarian government is to establish electromobility in Hungary by providing all the possible circumstances that will lead to the more common usage of electric vehicles. By identifying and collecting the possible participants of this plan, the government took the first step to implement a project with broad social acceptance.

The Jedlik Plan will be made in line with the intention of the European community but on the basis of a highly anticipated rise of the Hungarian electromobility industry. Bus manufacturers are capable of providing high-technology vehicles, and suppliers wait for the opportunity to develop innovatively and build the capability to enter the supply chains in the electric vehicle sector(Nagy, 2015b, p.9).

In order to revitalize industrial sectors, the Hungarian government established a new industrial plan.[40)] One of the plan's key sectors is the automotive industry. In March 2014, the prospective E-mobility Plan, the Jedlik Plan, was announced, and then in September 2014, the Jedlik Cluster was founded with the establishment of an action plan. Harmonizing with the EU action rules, the action plan is in accordance with Hungary's industry strategy policy of supporting electromobility and in line with the policy of developing education and creating new jobs (Nagy, 2015a, p.3).

3.4.1. Production Promotion Plan

The main policy directions of the Jedlik Plan are as follows: (1) connect research, development, and innovation(R+D+I) and support domestic production, (2) expand infrastructure and support project financing, (3) review legal and taxation conditions such as incentives, (4) community role in E-mobility, and (5) pilot project.

As a production promotion plan, the most important policy is to support R+D+I for manufacturers and suppliers of the automotive industry by operative programs

39) This section is based on the document "Jedlik Ányos Plan: E-mobility Concept of the Hungarian Government" (Nagy, 2015b) and discussions in several meetings on the industrial policy and electric car policy in Hungary with several Hungarian specialists (Laszlo Gyorgy and Peter Virovacz with the Szazadveg Economic Research Institutes, Jozsef Petho with Jedlik Anyos Cluster, Zsolt Barady with Evopro Group, and Gabor Lux with the Institute for Regional Studies of Hungarian Academy of Science). The final version of detailed plan for ecofriendly car production and promotion will not be released until the final report is submitted.

40) The final report was yet to be released at the time this report was submitted.

for 2014–2020. The plan includes support of high-quality infrastructure development projects and education of specialists and technicians.

3.4.2. Demand Promotion Plan

Unlike Korea, Hungary suggests nonfinancial types of support to promote electric cars. As a financial incentive, the current allowances for electrical vehicles are zero registration tax, zero vehicle tax, and exemption from pecuniary transfer duty (Nagy, 2015b,p.7). However, as seen in Korea's case in terms of the price difference between traditional fossil-fuel automobiles and ecofriendly automobiles, the financial incentives in Hungary are not enough to increase the demand for electric cars. In Hungary's case, the direct financing of electric cars is not possible due to the fact that most of the population is unable to buy an electric vehicle with their own sources or even with the additional governmental incentives. By adding indirect incentives, the Hungarian government intends to increase the number of electric vehicles step by step, urging the automobile manufacturers to keep with the increasing demand for electric automobiles.

Thus, the government set up nonfinancial allowances as follows: (1) as resellers, charging point owners shall be allowed to trade electricity with other owners, (2) the availability of night power (for at least eight hours at night) was expanded, (3) a green license plate number was offered, (4) plug-in hybrid, long-range electric vehicles and hydrogen-cell vehicles will be added to the beneficiary category, (5) parking boards and road margins will be different, and other policies to allow bus lanes, toll discounts, and free entry to reserved zones will be offered (for example, Buda Castle).

Another strategy to expand demand is to increase the number of charging networks for electric vehicles(Nagy, 2015b).In Hungary, there were only 60 charging points available to the public as of May 2015. As part of the Jedlik Plan, business associations and local municipalities will be given opportunities to provide alternative locations for charging points. Lightning chargers will be located like a spider's web, moving away from the cities. The charging period is 20–25 minutes. In the cities, the service centers and parking lots will be equipped with fast chargers with charging periods of 90–150 minutes. Homes will be equipped with the normal plug-in chargers with around six to eight hours of charging time.

4. Ecofriendly Automobile Dissemination Policies and Their Performance

4.1. Recent Status of Ecofriendly Automobile Dissemination

As discussed in Sec. 3, the government has continued to promote production of ecofriendly automobiles since 1992. The government investment under the next-generation car project for 1992–2001 achieved the development of a trial parallel-type hybrid bus with an automatic transmission (Asia Motors) in 1996 and a trial Click hybrid (Hyundai Motors) in 2001, etc. (see <Table 3-5> and <Table 3-6>). Even after this project, the government invested a huge amount to promote ecofriendly automobiles through the 10 Next-Generation Growth-Driven Industry Project and the New Growth-Driven Industry Comprehensive Promotion Plan.

Even with consistent government investments and support, ecofriendly cars are not yet a growth-driven industry. This is because the production cost of ecofriendly cars is still higher than that of fossil-fuel-based cars, and, thus, market demand is not promoted without government support. However, the demand for ecofriendly cars is growing in Korea as well as the global markets through technological innovation and government support. <Table 3-21> shows the world sales trend of hybrid cars.

From 2005 until 2013, there were approximately 7.5 million hybrid cars sold in the USA, Japan, and Europe. In 2005, 290,000 hybrid cars were sold in the USA, Japan and Europe, and by 2013, the number of hybrid cars sold increased to 1.7 million. With this increase, the market share of hybrid cars increased from 1.1% in 2005 to 7.3% in 2013.

〈Table 3-21〉 World Hybrid Car Sales Trend

(Unit: 1,000 cars (%))

Car		2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Hybrid cars (a)	Total	290	380	490	500	830	800	1,030	1,450	1,720	7,490
	USA	210	250	350	310	290	270	270	440	490	2,880
	Japan	60	90	90	120	460	440	660	870	1,020	3,810
	Europe	20	40	50	70	80	90	100	140	210	800
Total sales (b)	Total	26,870	27,140	26,730	24,570	22,990	22,810	22,400	23,570	23,680	220,760
	USA	7,650	7,760	7,560	6,760	5,400	5,630	6,080	7,240	7580	6,1660
	Japan	4,740	4,640	4,400	4,220	3,930	4,210	3,520	4,570	4560	3,8790
	Europe	14,480	14,740	14,770	13,590	13,660	12,970	12,800	11,760	1,1540	12,0310
Share (a/b) (%)	USA	2.7	3.2	4.6	4.6	5.4	4.8	4.4	6.1	6.5	
	Japan	1.3	1.9	2.0	2.8	11.7	10.5	18.8	19.0	22.4	
	Europe	0.1	0.3	0.3	0.5	0.6	0.7	0.8	1.2	1.8	

Source: Ministry of Environment (2015), p. 10.

<Table 3-22> shows the hybrid and electric car sales in Korea since 2005. In order to promote demand for hybrid cars, the central government allocated KRW 28 million from2004 to 2006, KRW 14 million by 50% central government from 2007 to 2008, and tax subsidies in 2009 (Ministry of Environment, 2015, p.10). With central government support, only 121 ecofriendly cars were sold in 2005, but it increased significantly to about 35,000in 2014. Thus, for 2005–2014, the total number of ecofriendly cars sold was about 140,000. With an increase in car sales, the market share of hybrid cars increased from 0.01% in 2005 to 2.60% in 2014.

〈Table 3-22〉 Hybrid Car Sales Trend in Korea

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Sales (cars)	121	145	724	997	7,312	8,473	20,271	37,030	28,092	35,383
Share (%)	0.01	0.02	0.07	0.10	0.59	0.65	1.54	2.83	2.17	2.60
Total cars	94	97	104	102	124	131	132	131	129	136

Note: Total cars are in thousands.
Source: Ministry of Environment (2015), p. 10.

<Table 3-23> shows the trend of electric car sales in Korea for 2011–2014. Compared to hybrid car sales, electric car sales were relatively lower. For 2011–2014,3,044 electric cars were sold, with an increase from 338 in 2011 to 1,173 in 2014.[41)]

〈Table 3-23〉 Korea Electric Car Sales Trend by Region

	Total	2011	2012	2013	2014
Total	3,044	338	753	780	1,173
Seoul	890	73	285	330	202
Busan	116	8	10	3	95
Daegu	22	7	5	4	6
Incheon	87	11	23	15	38
Dajeon	20	4	6	6	4
Ulsan	16	7	2	3	4
Gwangju	166	1	3	62	100
Sejong	7	0	2	2	3
Gyeonggi	204	35	74	31	64
Gangwon	45	9	10	6	20
Chungbuk	20	5	6	6	3
Chungnam	127	8	59	33	27
Jeonbuk	17	1	9	3	4
Jeonnam	175	50	40	22	63
Gyeongbuk	119	15	40	32	32
Gyeongnam	266	58	35	62	111
Jeju	747	46	144	160	397

Source: Ministry of Environment (2015), p. 15.

Based on the recent electric car sales trend, the government established a roadmap for disseminating and promoting electric cars and charging facilities <Table 3-24>. Through public and private sector collaboration, the government planned to disseminate200,000 electric cars by 2020 and install 632 charging facilities by 2017.

41) As of the end of June 2015, the total number of electric cars in Jeju Special Self-Governing Province was 1,000 cars (http://m.khan.co.kr/view.html?artid=201507031145471&code=620117, retrieved on July, 5, 2015).

To promote electric car demand, the government established a subsidy plan in 2015 for the price difference between electric cars and gasoline cars. First, there are KRW 15 million subsidies for high-speed compact sedans because the price difference with gasoline cars is about KRW 22–23 million, which is the same as the subsidies in 2014. Second, KRW 100 million will be subsidized for electric buses. Third, electric trucks will be subsidized by KRW 12 and 15 million for 0.5- and 1-ton electric trucks, respectively. Furthermore, the government will subsidize KRW 1 million for 3kWh class and KRW 6 million or 7 kWh class charging facilities (Ministry of Environment, 2015, pp.12–13).

〈Table 3-24〉 Roadmap for Electric Car Dissemination and Charging Facilities

	–2014	2015	2016	2017	2018	2019	2020
Cars	800	3,000	10,000	30,000	40,000	50,000	64,000
Charging facilities	60	100	150	150	198	170	400

Source: Ministry of Environment (2015), p. 11.

4.2. Jeju Special Self-Governing Province

This chapter covers practical case studies of ecofriendly automobile strategies in Jeju and Seoul. Jeju has a vision to replace all automobiles with electric cars by 2030 (Jeju Special Self-Governing Province, 2015, pp.2–3).The province has a target to replace 10% of cars with electric cars (29,000 cars) by 2017 and 30% (94,000 cars) by 2020(Jeju Special Self-Governing Province, 2015, p.2).

In order to achieve the electric car dissemination target, Jeju provides various financial subsidies and tax incentives. Jeju provides KRW 22 million in subsidies for sedans and KRW 17 million for electric trucks even with the diverse car prices of KRW 35 million to 64.7 million (Jeju Special Self-Governing Province, 2015, pp.6–7). Furthermore, about KRW 6 million is offered for fixed-type charging facilities and about KRW 1 million for movable types.

In addition, Jeju province provides various local tax incentives. <Table 3-25> lists the detailed tax exemptions by automobile brand. There is financial exemption support of about KRW 4 million on the condition that nominal transfer is not allowed for two years. The exemption limit is KRW 2 million of personal consumption tax, KRW 0.6 million of education tax, and total acquisition tax exemption for small cars but KRW 1.4 million for other cars. The acquisition tax is 5% of the car price (Jeju Special Self-Governing Province, 2015, p.11).

In total, the financial support to promote electric car demand is about KRW 28 million regardless of vehicle type (sedan or truck) or brand.

〈Table 3-25〉 Tax Benefits for Electric Cars in Jeju City

(Unit: KRW 1,000)

Category	Ray (subcompact)		Spark (small)		SM3.Z.3. (small)		Labo PEACE (sub-compact)		Miscellaneous	
	Before tax cut	After tax cut	Before tax cut	After tax cut	Before tax cut	After tax cut	Before tax cut	After tax cut	Before tax cut	After tax cut
Total	3,151	130	4,334	543	4,509	634	3,299	28.5	5,420	1,420
Individual consumption tax	1,590	-	1,831	-	1,904	-	1,722	-	2,300	300
Education tax	477	-	543	-	571	-	516	-	690	90
Acquisition tax	954	-	1,813	413	1,904	504	1,033	-	2,300	900
One-year automobile tax	130	130	130	130	130	130	28.5	28.5	130	130
Factory price	31,818		36,272		38,090		34,454 (expected)		46,000 (example)	
Automobile sales price	35,000		39,900		41,900		37,900 (expected)		50,000 (example)	

Source: Jeju Special Self-Governing Province (2015), p.11.

4.3. Seoul Metropolitan City

<Table 3-26> shows the tax benefits for electric car consumers in Seoul in 2015. Excluding subsidies from the central government, the city of Seoul provides subsidies of up to KRW 6 million for the purchase of electric cars. The subsidies include partial exemption of individual consumption tax, education tax, acquisition tax, and urban railway public bonds. The benefits for acquisition taxes were originally scheduled to expire on December 31, 2014, but they were extended for one more year(Seoul Metropolitan City, 2015, p.47).

〈Table 3-26〉 Financial Support to Promote Demand for Ecofriendly Cars in Seoul

Category	Tax cut limit (KRW 1,000)	Time limit
Total	6,000	
Individual consumption tax	2,000	2015.12.31
Education tax	600	2015.12.31
Acquisition tax	1,400	2015.12.31
Urban railway public bonds	2,000	2016.12.31

Note: The benefits for urban railway public bonds are provided only when purchasers register by December 31, 2016 according to the revision of the enforcement ordinance.

Source: The Enforcement Ordinance for the Urban Railway Law(Presidential Decree No. 25840, enforced on January 1, 2015); Seoul Metropolitan City (2015), p.47.

5. Conclusion and Policy Suggestions

Reviewing the recent new growth-driven industry policies in Korea after the 1980s, this report investigates ecofriendly automotive policies focusing on production promotion and demand promotion. For production promotion, the government of Korea continues to support the ecofriendly automotive (next-generation cars, smart cars, green cars, etc.) sector through huge R&D investment. In addition, due to the price difference between fossil-fuel cars and ecofriendly cars, the government tried boosting market demand for ecofriendly cars through huge support through tax cuts (consumption, educational, acquisition) and subsidies. For example, in Jeju, about USD 28,000 is subsidized for electric car purchases with a price of about USD 35,000–60,000 in Jeju(Ministry of Environment, 2015, p.10).

Hungary plans to reindustrialize its economy, and it selected the automotive industry as a major growth-driven industry. Even before the transition reform in the 1990s, Hungary played an important role in producing automobiles and electronics. Even though the country gave up producing automobiles too quickly(especially buses), Hungary still has competitive, skilled laborers and historically renowned engineers and scientists. Thus, by sharing economic and industrial development experiences, especially new growth-driven industry policies focusing on the ecofriendly automotive industry, between Hungary and Korea, this report suggests several policy recommendations.

First, it is important to realize how the two countries face different economic environments when implementing new growth-driven industry policies. As already explained, the important strategies to achieve rapid economic growth in Korea were government-led export-promotion policies combined with very strong

domestic protection until the 1980s. However, it is difficult for Hungary to follow the government-led industrial policies that Korea did. This is because Korea used the industrial policies when it was less exposed to international pressure. Hence, Korea was able to use its independent export-expansion policies as well as promote the import-restricting policies to protect its domestic corporations and market.

In Hungary's case, however, its EU membership prevents it from using similar independent industrial policies. It is difficult for Hungary to implement government-led strategic industrial policies. This is because Hungary, as an EU member, should follow the EU's policy direction. Therefore, various industrial policies that contributed to Korea's economic growth cannot be applied to Hungary. Hence, it is necessary to share careful policy suggestions when applying the Korean policies in Hungary.

There are several policy recommendations through comparative studies for new growth-driven industry policies and ecofriendly automotive industry strategies.

First, we recommend maximizing the linkage effects in the automotive industries through combined policies between automobiles and parts. Even before the transition in the beginning of the 1990s, Hungary played an important role in producing automobiles, especially buses, with skilled workers and expertise. Unfortunately, Hungary stopped producing these automobiles by stopping trade with its former trade partners.[42)]

In the automotive industry sectors, there are four multinational companies with domestic SMEs. Even with strong production capacity in expertise and labor, Hungary still depends on component imports. Therefore, it is necessary to attract more SMEs that are global to provide components to multinationals located in Hungary and export them to international partners. Then it is necessary to implement policies to promote international competitiveness of domestic component companies and increase component exports.

Since the 1960s, Korea has continuously implemented policies to increase the share of domestically produced goods in the domestic market via subsidies for the automobile industry as well as the protection of the domestic parts and materials industry and the domestic market. Hungary should examine these policy directions and search for actions it can take while considering its EU membership.

42) This is based on the summary of opinions by the Hungary consultant Ádám Nagy and meeting discussion with Dr. Garbor Lux, Hungarian Academy of Sciences CERS Institute for Regional Studies.

Second, we recommend establishing policy strategies to combine the German model with the East Asian model development process. As already mentioned, Hungary is in a distinct environment, in which it cannot use the infant industry protection policies that Korea did. Therefore, within this distinct environment, Hungary needs to implement an appropriate policy for its automobile industry based on the discussion of the German model and the East Asian model.

As Lux (2015) indicated, the German model attracts multinational companies to boost domestic component companies and, thus, expects linkage effects between automotive companies and component companies. By becoming more competitive, domestic companies can export their components. However, the East Asian model (the development state model)has strong government-led industrial policies. This was why the Korean government declared the heavy chemical industry as a new growth-driven industry in 1973 through a rapid economic growth process.

As an EU member and due to international pressure on globalization, Hungary cannot implement the East Asian model like Korea did. Therefore, we recommend combining two different development models. For the automotive industry, we recommend attracting multinational automotive companies and promoting domestic component companies. However, electric buses produced locally can be exempted. Since Hungary already has production experience and production capacity, it will be promising to establish and implement automobile production strategies. For this purpose, produced by domestic companies and used by multinational companies can be produced for the buses produced by domestic companies as well.

For this purpose, we recommend expanding the strategic partnership programs started in 2012 to more global companies. More details on this program's policies are given in the Ministry of Strategy and Finance and KDI (2014, pp.137–141). We know that until 2013,13 of the 38 partnerships were with automobile-related companies.

Third, we recommend implementing policies to develop high-quality human resources. Hungary already has skilled workers and the capability to develop highly skilled human resources.[44] However, due to insufficient financial resources, it is difficult to promote high-quality human resources by direct government investment.

43) Even under a communist regime, Hungary produced and exported the bus called the "Ikarus Bus" to other socialist countries such as the Soviet Union and China.
44) More details on the education system and system to develop human resource promotion are covered in Chap. 2 of this KSP program.

Since Hungary plays an important role in producing and exporting automobiles, there are automobile-related workers, implying that there is capacity to increase these workers. However, producing ecofriendly cars following the global megatrends of the future automotive industry should be conducted by updated technologies such as the most advanced technology, ICT, semiconductors, and electronics. With collaboration of multinational automobile companies located in Hungary, research institutes and collaborative programs between corporations and universities will be quite helpful to promote human resources with more advanced technological capacity. Furthermore, this kind of collaboration can be included in the strategic partnership program as well.

Since the 1960s, Korea has been continuously implementing policies to develop human resources in order to support corporations and train researchers and technicians. Korea consistently supported the national research and development institutes such as KIST and developed new technologies and human resources.

For the development of high-quality human resources through the connection between corporations and academia, in Korea, there are several contract departments in the automotive sector. The Hyundai Motor Company has a contract department at Korea University(http://hyundai.korea.ac.kr/, retrieved on June 1, 2015) and Hanyang University (http://aec.hanyang.ac.kr/intro/intro.php, retrieved on June 1, 2015). The department teaches courses infields related to electronic control and convergence in the automotive sectors and delivers special lectures by field experts, which leads to students finding work in their field right after graduation.[45)]

Fourth, investing more aggressively in ecofriendly automobile production is necessary. In Korea, it is too early to assess the outcomes of the ecofriendly automotive policies clearly, because they are still developing ecofriendly cars. When we examined the new growth-driven industry policies, we found that the Next-Generation Car Promotion Policy was implemented during the Leading Technology Development Project in 1992, yet its performance was not as sufficient as desired. However, it is quite important to invest more resources to promote ecofriendly cars and components. As was discussed, the industries that cannot follow global megatrends cannot survive in the future.

Hungary declared the E-mobility Plan in March 2013 and established the Jedlik Cluster under the Ministry of National Economy and National Innovation Office. The main characteristics of the plan are (1) the combined R+D+I strategy to produce domestic electric cars, (2) infrastructure expansion to support project financing, (3)

45) See http://www.hyundai-scholar.com/ContractCurriculum.do (retrieved on June 1,2015) for a more detailed explanation.

readjustment of legal issues and tax incentives, exemption from acquisition tax, etc., and (4) strengthened community role to allow electric bus and taxi usage.

For ecofriendly car production, there are no sufficient investment resources yet, but the government needs to consider this investment as a priority. However, it is especially not recommended to initiate production of automobiles directly, except for buses. Since there are four multinational automobile companies, it will be quite useful to attract global SMEs that will provide components to the multinational enterprises located in Hungary and then export their products to the international markets.

Finally, ecofriendly car consumption promotion policies should be more extensively implemented. In Korea, the strategies in the E-mobility Plan include mostly dissemination promotion plans without significant financial support. The tax incentives offered by the plan might not be enough to cover the price difference between fossil-fuel cars and ecofriendly cars. As Sec. 4 summarized, about USD 28,000 is provided for electric car purchases in the 2015 Jeju and Seoul electric car dissemination promotion plan. This includes support from the central government and local tax subsidies.

46) Since the final version of the new industry policies is not formally released, it might be too early to evaluate the strategy planned by the Hungarian government.

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Appendix: Global Megatrends and Industrial Policy

PWC (2014) and KPMG (2014) suggested the following megatrends: (1) demographic and social change: population growth and workforce diversity, (2) shift in global economic power, (3) rapid urbanization, (4) climate change and resource scarcity, and (5) technological breakthroughs.

More details on these megatrends follow.

1. Demographic and Social Change

(a) Population growth and social welfare system: Because of the increase in the absolute population, longer life expectancy, and declining birth rate, another challenge for the aging population is maintaining the solvency of social welfare systems, including rising healthcare costs and pensions (PWC,2014, p.5; KPMG,2014. p.11).
(b) Population growth and work diversity: People who are planning to move will increase 50% by 2020. This reflects the rising workforce diversity(PWC, 2014, pp. 5–6).

2. Shift in Global Economic Power: Purchasing Power and Middle Class

(a) Purchasing power: By 2030, the aggregate purchasing power of the emerging economies, Brazil, China, India, Indonesia, Mexico, Russia, and Turkey, will overtake that of the current G7 countries. The change of economic purchasing power between countries and/or groups will lead to significant change in consumption patterns. The change also leads to different patterns of infrastructure investment. Because of China's fast growth, the share of global infrastructure spending by the Asia Pacific will be 60% by 2025(PWC, 2014, p. 7–8).
(b) Middle class: Further, by 2015 the middle class in the Asia Pacific will be larger than that of Europe and North America combined.

3. Rapid Urbanization

In 2014, 54% of the world's population lived in urban areas. The ratio was 30% in 1950. By 2050, 66% of the population is projected to be urban (UN, World Urbanization Prospects, 2014 revision, p.7). In order to make cities livable, it is inevitable that we will need to think more about the environment, infrastructure, and social fabric.

4. Climate Change and Resource Scarcity

(a) As the world's population and urbanization expand, the demand for energy, food, and water will rise as well. However, the planet's natural resources are finite and may not be sufficient for the growing demand. Sustaining the current economic growth and development is highly dependent on fossil fuels with high carbon emission, and, thus, it looks difficult to reach the target of maintaining a 2 °C temperature increase. Governments and businesses realize the environmental and social impacts of their policy decisions and actions(PWC, 2014, p. 3–4).

(b) The combined pressures of population growth, economic growth, and climate change will place increased stress on natural resources such as water, food, arable land, and energy. The possible exhaustion of fossil fuels and climate change will lead to energy security and further national security.

5. Technological Breakthroughs

(a) The time it takes to go from breakthrough technology to mass-market application is collapsing. In the U.S., it took the telephone 76 years to reach half the population. The smart phone did it in under ten years. The price of new technologies is falling equally and rapidly. The impacts of digital disruption are now so pervasive that no business in any sector—from the smallest family business to the largest multinational—is immune from them(PWC, 2014, p.9).

(b) ICT transformed society over the last 30 years, and a new wave of technological advances is creating new opportunities(KPMG, 2014, p.22).