



# **CURRENT EFFORTS TO EXPAND INDICATORS ON HRST IN KOREA**

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# 1. Introduction

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# Importance HRST for R&D Policy

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- Why increased attention to HRST?
  - Development of knowledge-based society
    - Not confined to economy, but all areas of society
  - Increased role of HRST possessing expert knowledge and skill
  - Many countries are trying to build up qualified HRST and utilize them effectively
    - Korea is also no exception in this trend



# Current Situation of Korea

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- Developed from a rural to an industrial society in less than a half century
- Now confronted with new challenges in the 21<sup>st</sup> century
  - Impact of financial crisis (1997-98) : Structural adjustment in economy and society
  - Catch-up of other countries in the region and emergence of China as a 'black hole'
  - Turning-point for the next economic leap towards the position of an advanced country
- Urgent needs for an effective HRST policy



## **2. HRST Issues in Korea**

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# Overall State of HRST (1)

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- Korea has experienced a fast quantitative expansion of higher education sector
  - Total 419 higher education institutions in 2005, while very few after Korean War(1950-1953)
  - Number of university and college students: 146,141(1970) →1,836,649(2004)
  - Advance rate of high school leavers : 33.2%(1990) →81.3%(2004)
- Especially, the number of students and graduates in S&E has increased faster



## Overall State of HRST (2)

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- Characteristics of education system in Korea
  - Fast expansion, great willingness for higher education
  - Concentration on technicians and engineers from the beginning of development (recently increased emphasis on basic scientists)
  - Since 1980, greater expansion in S&E fields than other fields thanks to strong policy drive
  - Proportion of college graduates in S&E fields is higher than other OECD countries



# Current Issues in HRST Policy(1)

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- Complaints in mismatch between supply and demand
  - Despite quantitative expansion, quality of education and graduates does not match the expectations
  
- Quantitative mismatch
  - Supply of HRST by fields, level of education does not match the actual demand in society
  - Difficulty in finding adequate personnel despite a large number of college graduates (esp. for SMEs)
    - Partly due to relatively inferior working conditions of SMEs and preference of labor market entrants



## Current Issues in HRST Policy(2)

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### ○ Qualitative mismatch

- Based on the recognition that the quality of college graduates in S&E does not match the requirements in workplaces
- Reasons are reduction of S&E education courses in secondary schools and lower participation of university students in in-depth courses
- Result in high costs of re-education for the labor-market entrants



## Current Issues in HRST Policy(3)

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- Discontents with education capability of universities
  - Discussions on the universities' incapability in coping with environmental changes and reforming their S&E curriculums
  - Despite quantitative expansion, quality dimension of education has not been considered sufficiently
  - Not enough courses to teach 'soft skills' (team work, communication skill etc.) for S&E students
  - Result in 'brain drain' of high-quality students into foreign universities and failure to attract foreign scholars
- Increasing needs for qualitative upgrade of the overall university systems



# Policy Reactions (1)

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- Discussion on the “crisis in S&E”
  - Became a social issue at the ends of 1990s
  - Reasons are:
    - Deteriorated labor market situation after financial crisis
    - Decrease in the interests in S&E among young people
    - Lower socio-economic rewards for S&E
  - Led to government’s policy reactions such as “Promoting Young People in S&E”
    - Goal-setting for graduates in S&E in public sector
    - Reduction of service period for “Professional Research Personnel” etc.



## Policy Reactions (2)

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- “Strategies for Strong Korea with Creative Human Resources” (2005)
  - Proposed by PACST (Presidential Advisory Committee on S&T) and being implemented by government
- Three main policy areas
  - Promote ‘software reform’ of universities (curriculums, education culture, competition etc.)
  - Strengthen research and education capability of universities through financial and administrative support
  - Fortify academia-industry cooperation to solve youth unemployment problem and promote commercialization of research outputs



## **3. Existing HRST Statistics**

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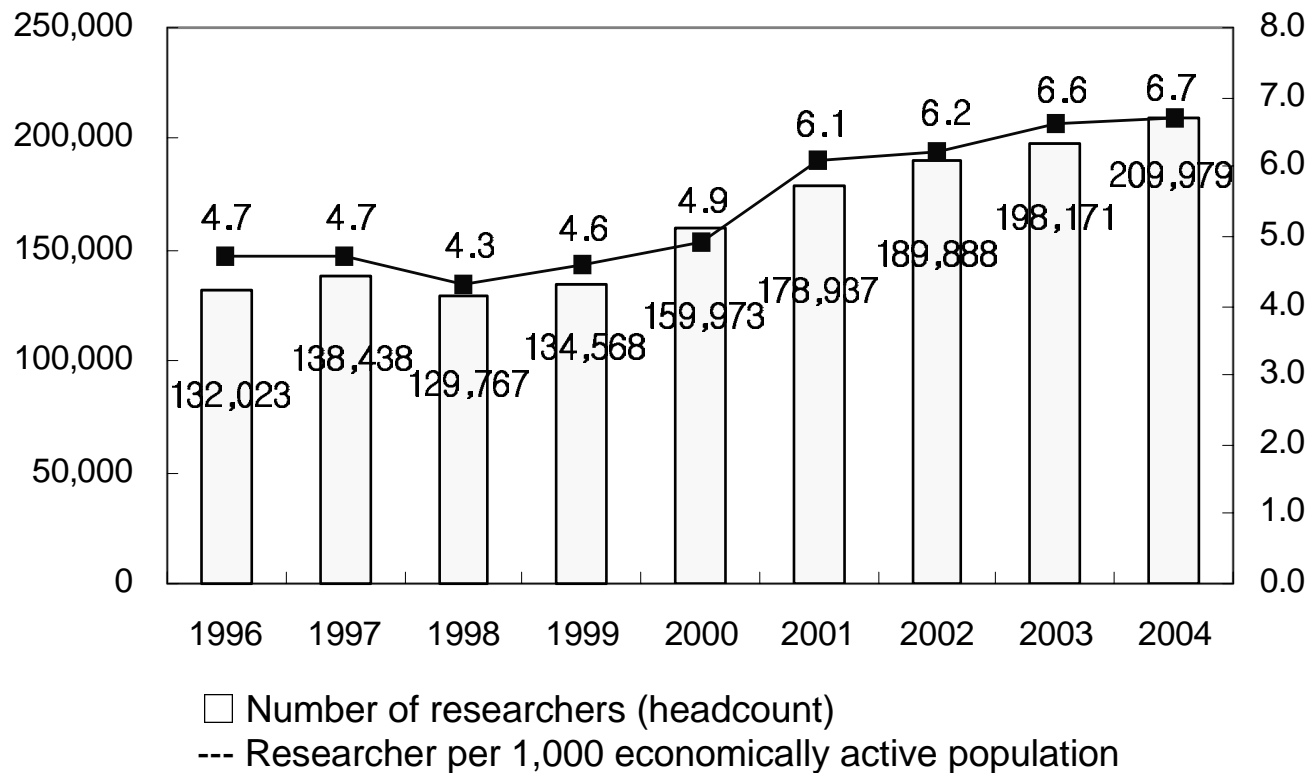
# Difficulty in Measuring HRST

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- Diverse ways to measure HRST
  - Canberra Manual recommends using two dimensions (educational credential and occupation)
  - However, measuring HRST using these two dimensions is not simple due to the difficulty in harmonizing data on education and occupation
    - Also a reason why there is no internationally comparable data on HRST
- Relatively good availability of data on R&D personnel and researchers
  - Korea is conducting Annual Survey on R&D Activities (MOST)
  - Statistics on R&D personnel and researchers are consistent with OECD standards

# Statistics on R&D Personnel and Researcher (1)

Trends in the Number of Researchers (1996-2004)



Source: MOST/KISTEP (2005).



# Statistics on R&D Personnel and Researcher (2)

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- The number of R&D personnel and researchers increases continually
  - In 2004, there were 312,314 R&D personnel and 209,979 researchers (headcount)
  - Correspond to 6.7 per 1,000 economically active population
  - Relative proportion to the population is nearing that of Germany and France, but much lower than Japan and USA
- Distribution of researchers varies by sector and level of education
  - Over 70% of Ph.D. holders are in universities, while only 15% are employed in enterprise sector
  - Despite quantitative expansion, industrial R&D is still mainly conducted by researchers with B.A. or M.A. degree



# Estimation and Forecast of HRST (1)

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- Increasing needs for estimation of state and future trend in supply of and demand on HRST
  - “Framework Law on S&T”(1999) proposes conducting regular (three year) mid- and long-term forecast of HRST
- Approach to estimate the size of HRST
  - In order to enable comparison, only ‘core HRST’ are considered (education in S&T + related occupation)
  - Estimation of the present and future trends in the supply of HRST on the basis of education statistics
  - Estimation of the present and future demands on HRST on the basis of labor force statistics



## Estimation and Forecast of HRST (2)

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- The number of employed in S&T-related occupations are expected to be more than two Million in 2014
  - Women shall increase faster than total HRST

### Number of Employed in S&T-related Occupation

(Unit: Thousand, %)

Year	2004	2005p	2010p	2014p	Annual Growth Rate(%)
Total	1,292	1,368	1,796	2,066	4.8
Women	421	451	635	776	6.3

Source: MOST (2006).



## Estimation and Forecast of HRST (3)

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- Comparison of supply and demand
  - General oversupply of HRST is expected, esp. for lower-level graduates in S&E (Junior College level)
  - However, shortage of supply is expected for Ph.D.s in certain fields (e.g. engineering) due to continual expansion of industrial R&D activities
- Limitations of projection
  - Based on many assumptions (future economic projection, demographic changes, labor market activities etc.)
  - Cannot consider policy impacts and individual adjustments to the results of projection (“self-defeating prophecy”)
  - Therefore, the results of projection should be dealt with carefully



# Statistics on International Mobility (1)

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- Increasing needs for statistics on international mobility
  - Reasons are large number of students and researchers going abroad, still small yet increasing number of foreign researchers, outflow of industrial researchers etc.
  - Needs for more detailed data on mobility of researchers
- There is no encompassing statistics on international mobility of HRST in Korea
  - No national survey on the international mobility
  - Fractional data on various dimensions of mobility
    - Statistics on foreign students and Ph.D. holders
    - Annual statistics on Immigration and emigration
    - Statistics on Korean students/researchers in other countries (e.g. NSF data)
    - Other survey results on the outflow of industrial researchers (limited availability) etc.



## Statistics on International Mobility (2)

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- Results of analysis of existing data and materials
  - Outflow of students exceeds inflow of foreign students into Korea, and qualitative imbalance exists
  - More than 600 Koreans register their foreign Ph.D. in S&E annually (social sciences excluded)
    - Cover only about a half of total foreign Ph.D. awardees
    - USA is the most important host country, and Japan second
  - In the USA, more than 1,000 Koreans achieve Ph.D. in S&E annually (social sciences included)
    - Many of them plan or definitely plan to stay in the USA
  - Among foreign scholars in the USA, Korea is the second largest sending country after China (7,290 in 2003-2004)
    - Growth rate of foreign scholars is the highest for Korea
  - About 12% of the surveyed enterprises in Korea have experienced the outflow of researchers (Survey result in 2001)



## **4. Recent Efforts to Expand HRST Statistics**

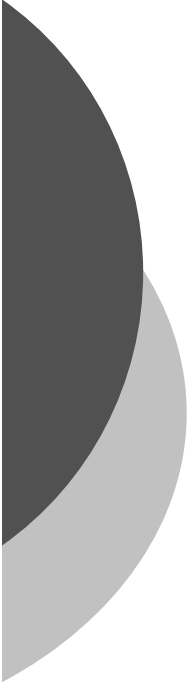
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# General Situation

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- Growing interests for more reliable and detailed statistics on HRST
  - Not only for policy-making but also for a better understanding of school-to-work transition
  - Efforts to refine existing statistics to meet new demands, and to launch new surveys on specific themes
  - Increased awareness of necessity to harmonize different statistics and indicator conducted by different ministries and research institutes



# Survey on the Status of S&E Personnel (1)

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- Backgrounds

- Based on the “Special Law for Nurturing and Supporting S&E Personnel” (direct reaction to the crisis in S&E)

- Aim and objectives

- Provide a status-quo review of S&E personnel in universities, public institutes and enterprises
- Provide detailed data on career path of ‘Major S&E Personnel’ (including Ph.D.s in S&E)
- Conduct follow-up survey of sampled S&E personnel for the accumulation of longitudinal data



# Survey on the Status of S&E Personnel (2)

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- 'Institution Survey'
  - Conducted for a sample of institutions employing S&E personnel
  - Survey items are educational backgrounds (by fields of study), present occupation and type of work, average level of income, future recruit plan of institution, types of on-the-job training etc.
  
- 'Individual Survey'
  - Conducted for a sample population of 'Major S&E Personnel'
  - Items are educational backgrounds, support for the study, current job and type of work, previous occupation (sector, time period etc.), future plan for movement, experiences in foreign study or employment etc.
  - Aim to construct a panel that will be surveyed in a regular term



# Study on the International Mobility of S&E Personnel (1)

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## ○ Backgrounds

- Increasing concern about brain-drain of qualified HRST
- No systematic data on international mobility of HRST

## ○ Policy directions

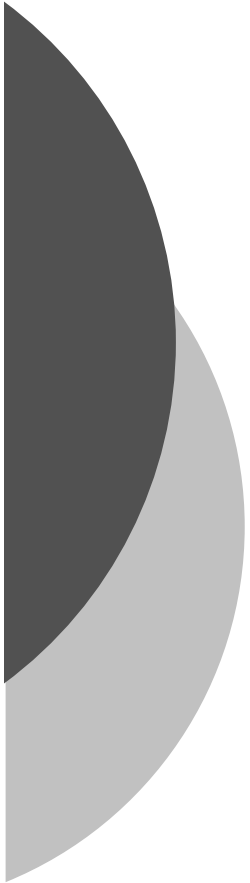
- Constructing systematic database on mobility of HRST will be possible only by a long-term project
- Need to examine existing statistics related to this issue and, if necessary, design new surveys
- For this purpose, harmonization and cooperation of various ministries and researchers are important



# Study on the International Mobility of S&E Personnel (2)

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- Balance Index proposed by “Special Law”
  - Special Law proposes a regular survey on the international mobility of S&E personnel and production of “Balance Index” (comparison of in- and outflow of S&E personnel)
  - Producing a balance index requires better basic statistics and stronger international cooperation to harmonize each country’s data
  - Unsolved methodological problems : Affiliates of foreign MNCs, return of foreign Ph.D. holders into Korea etc.
  - Thus, definition of terms and methodological guideline are needed
  
- Current efforts
  - Conduct a study to review existing statistics on the mobility of HRST and search for an effective way to improve and complement them
  - A survey on the in- and outflow of S&E personnel in public institutes and enterprises (due to greater policy need) are being conducted



# **5. Conclusion**

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# HRST Statistics in Korea : Summary

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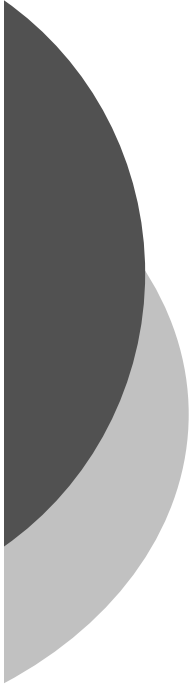
- High priority of HRST policy
  - Continuous economic development is possible only by existence of high-quality HRST
  - Government sets high priority on HRST
- Increasing needs for better statistics on HRST
  - For effective policy planning and implementation, better statistics and indicators on HRST are needed
  - Considering limitations of existing statistics, new surveys and methods are needed to shed light on various dimensions of the activities of HRST
    - Ex) Education, labor market transition, career path, international mobility



# Implications

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- Harmonization of HRST statistics at national level
  - Backgrounds are increasing relevance of HRST for the whole society and diversification of HRST policy
  - A series of new surveys are being planned and will be conducted in near future to complement existing statistics
  - In order to provide coherent data and signals for policy, harmonization of existing statistics and future surveys is needed
  
- Needs for international cooperation for HRST statistics and indicators
  - Especially international mobility of HRST cannot be accessed properly by a single country
  - Also international efforts are needed to provide detailed methodological guideline for measuring HRST and here the role of OECD is important



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# Thank you!

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