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# Analysis of Japanese Trends for Better Cultivation of Human Resources in Science and Technology (HRST)

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## 2 . Outline of The Presentation

- ( 1 ) The survey conducted by MEXT in 2003 has clarified:  
the doctoral recipients in Japan are employed far more by universities and academic institutions and far less in other sectors.
- ( 2 ) In drawing up the 3rd S&T Basic Plan, actual conditions of HRST should be studied and analysed so as to diversify their occupations and employment sectors.
- ( 3 ) Here, we report on our recent questionnaire-survey conducted on researchers and administrators in academic institution and industry, and describe some key features of present situations of Japanese HRST
- ( 4 ) We also describe our bench-marking studies to disclose distinctive features of Japanese HRST with respect to other countries, and discuss key issues to diversify their occupations and employment sectors.

# 1 . Cultivation of Human Resources in Science and Technology: One of The Top Priority Subjects in Japan

- ( 1 ) Policy for “ Fostering and Securing of HRST ” is set as one of the top-priority subjects, through the 1st/2nd S&T Basic Plans.
- ( 2 ) As a result, various programs for cultivating HRST have been greatly strengthened; the number of post-doctorates has now reached over 10,000 (a target level).
- ( 3 ) Policies and actions are needed to ensure that these high-level human resources (doctorate recipients) are well employed and utilized in a variety of professions and employment sectors.

### 3 . Background of The Presentation

- ( 1 ) NISTEP has started the basic survey (2004- 5) to find facts , relevant to “Fostering & Securing HRST in Japan”
- ( 2 ) On the basis of this fact-finding survey, “achievements and consequences of HRST policies” have been examined, and “issues and their countermeasures” have been studied.

## 4 . Main Aims of the Basic Survey

- By analyzing “the Basic survey ” , we intend to find ways and plans

To enhance the mobility of HRST

To cultivate and support younger HRST

To diversify careers of HRST

To strengthen management systems for R&D

To strengthen support systems for R&D (such as technical support staffs)

## 5 . Six Key Steps for Policy Review

- HRST policies have been reviewed in “6 Steps”

Fact-data survey on achievement of HRST policies

Interview survey of “administrators conduct HRST policies”

Questionnaire survey of “administrators, view on HRST policies”

Interview survey of “researchers, view on HRST policies”

Questionnaire survey of “researchers, view on HRST policies”

Achievement Evaluation of HRST policies, by the integrative study of fact-data survey, interview survey, and questionnaire survey

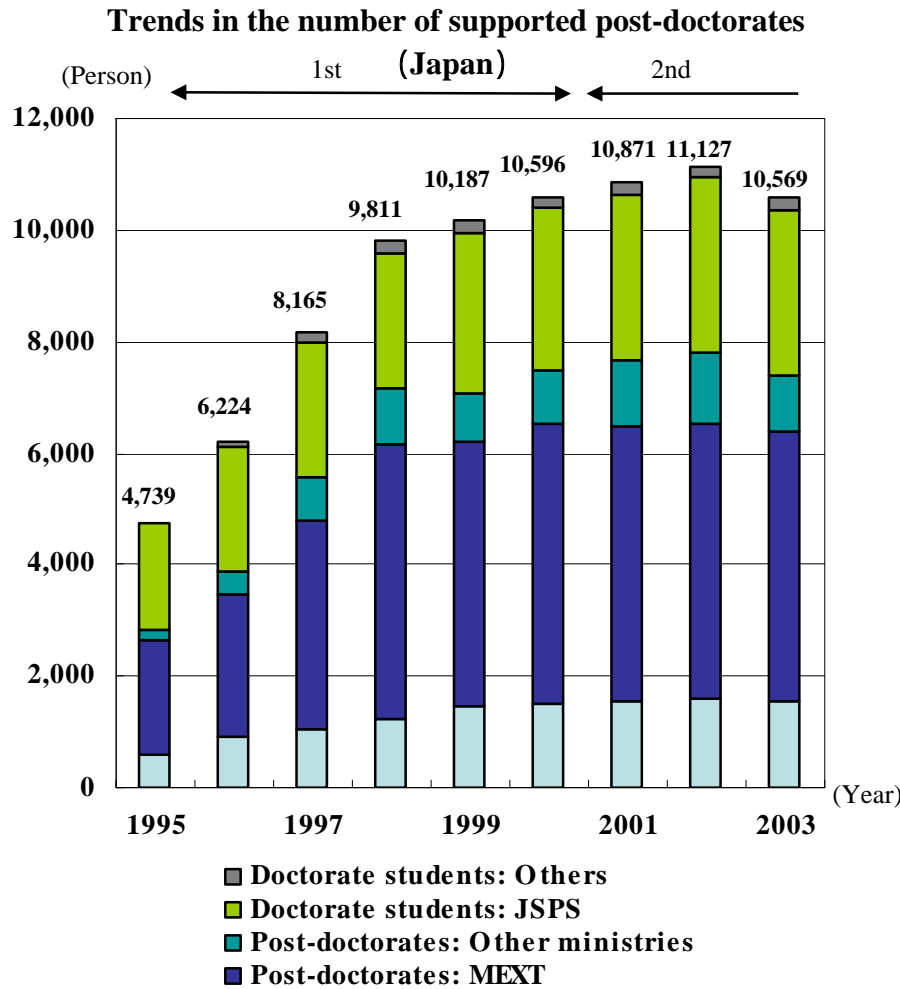
# 6. Japanese HRST ①

## Number of Post-Doctorates

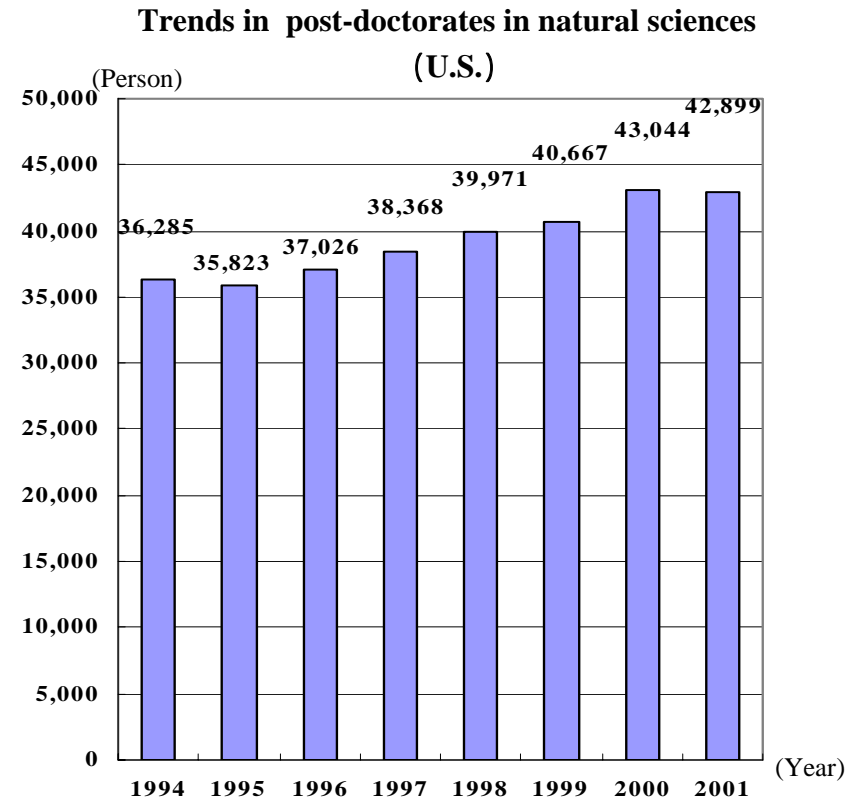
(1) The number of Japanese post-doctorates is over 10,000.

(2) In S&T fields, the number of post-doctorates in Japan is about 6,750.

(3) Us post-doctorates in S&T fields number about 43,000.



Source: MEXT S&T Policy Bureau's budget data



Source: NSF, "Survey of Graduate Students and Postdoctorates in Science and Engineering"

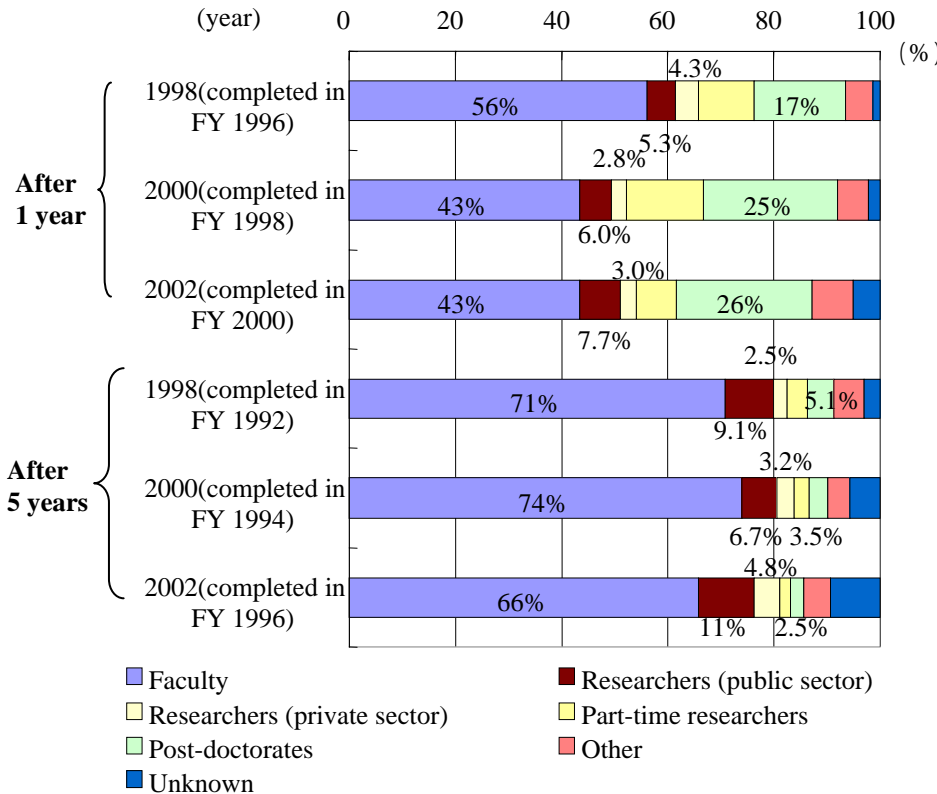
\*: As for 2003, the number of post-doctorates in social science and humanities employed between 2001 and 2003 was deducted from the total number of the number of post-doctorates in FY2003.

# 7. Japanese HRST ② Careers for Post-doctorates

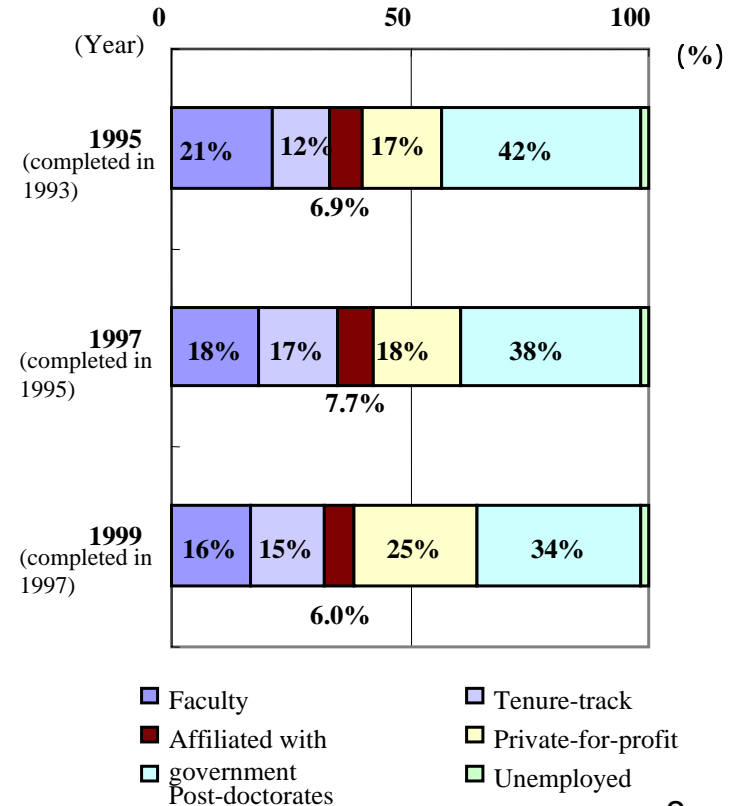
(1) In Japan, within 5 years, about 80% have gained full-time jobs. However, more HRST tend to get part-time job or to continue post-doctorate.

(2) In U.S., the ratio to choose career in private-for-profit has increased. On the other hand, the ratio in academic institutions has decreased.

**Japan : Careers one and five years after the completion of (JSPS) post-doctorates**



**US : Careers two years after the completion of post-doctorates**

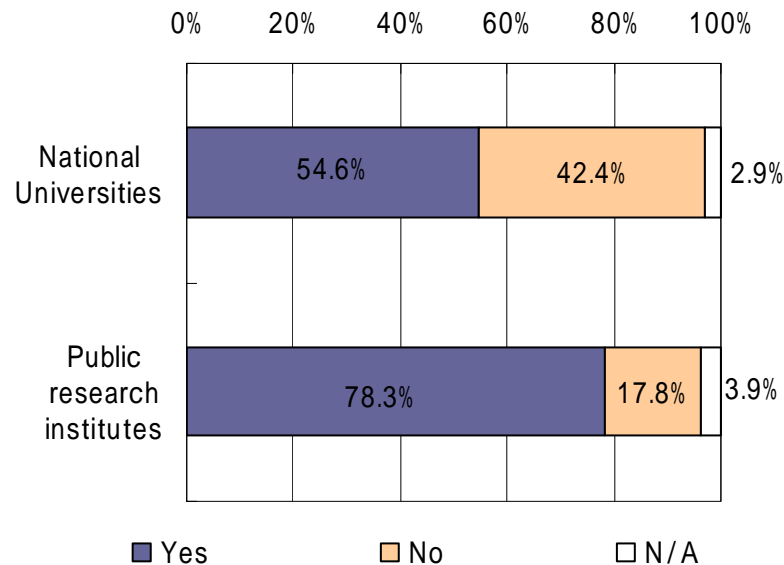


Source: JSPS data and the NSF "Survey of Doctorate Recipients"  
Japan's data cover only JSPS post-doctorates.

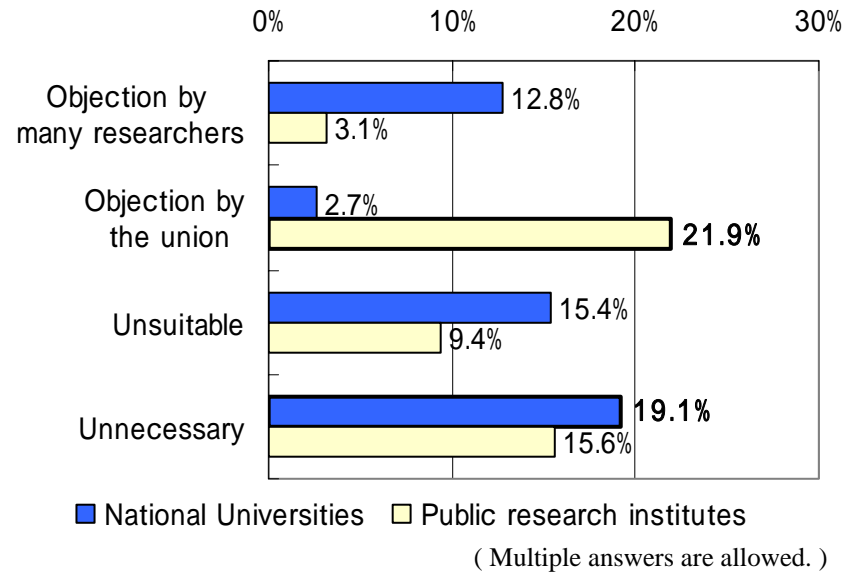


## 8 . Japanese HRST ③ Fixed-term appointment

**Q: Has the fixed-term appointment been introduced into your faculty/department ?**



**Q: Why does not your institution introduce the fixed-term appointment ?**



Source: NISTEP "Questionnaire survey of research managers on the evaluating the achievements of measures the S&T Basic Plans for HRST (FY2003)"

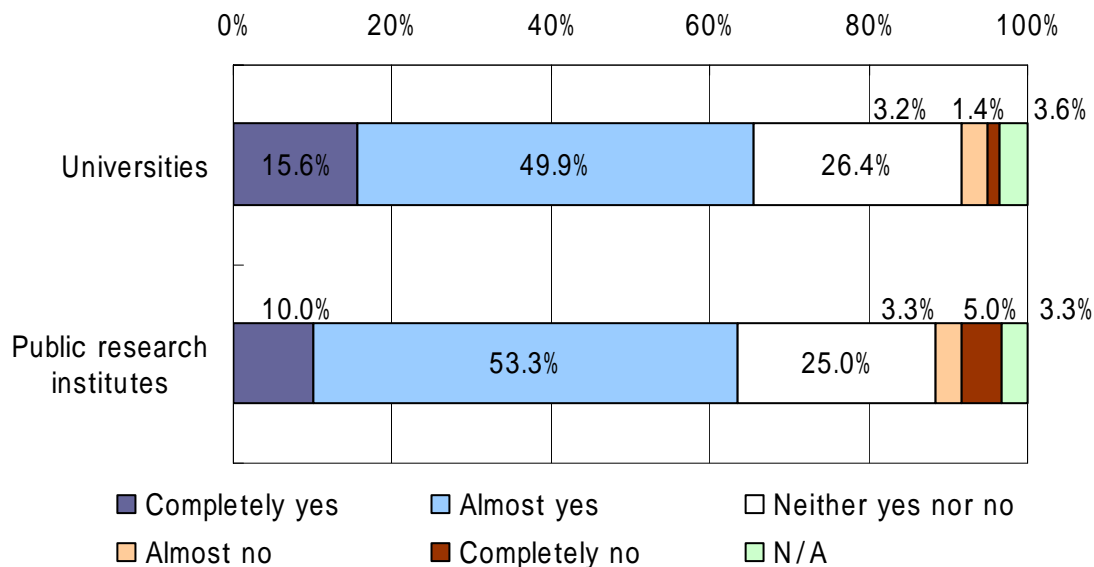
- (1) About 55% of universities and about 80% of public institutes have introduced the fixed-term appointment.
- (2) Main reasons why institutes do not introduce the system are "Unnecessary" (universities) and "The union is against." (public institutes).

## 9 . Japanese HRST④

### Fixed-term appointment and R&D activity

**Q: Is the fixed-term appointment effective in R&D activities ?**

(answers by Managers and Administrators)



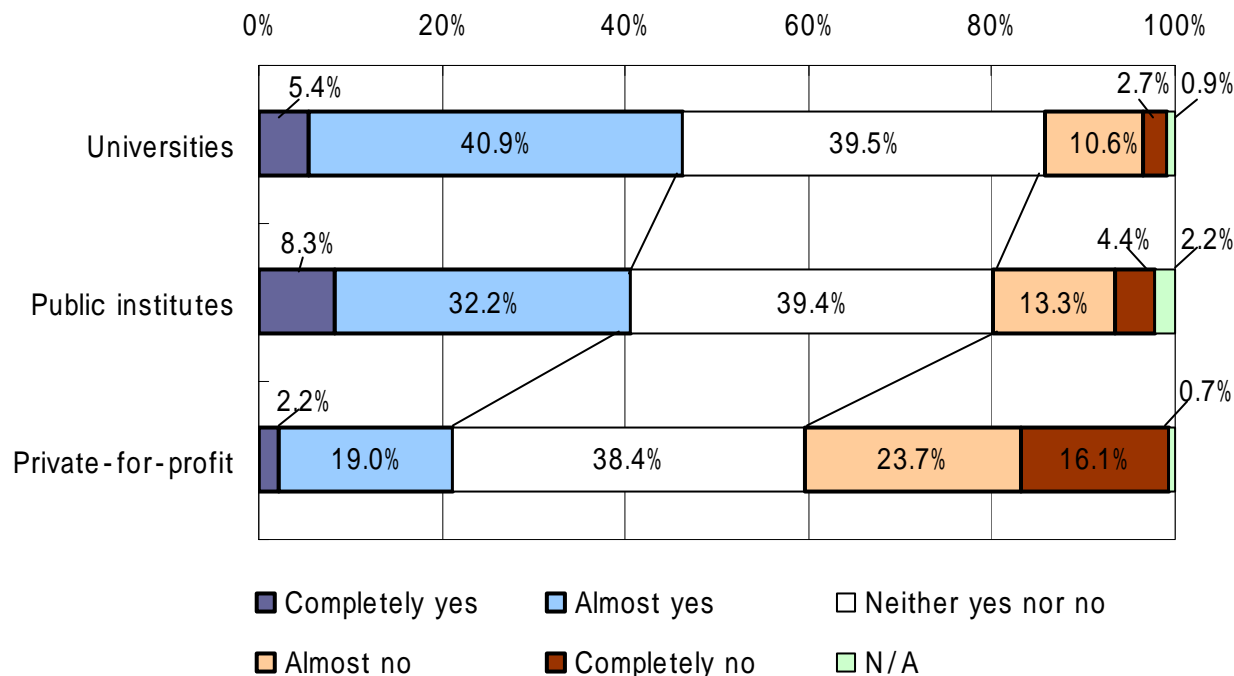
Source: NISTEP "Questionnaire survey of research managers on the evaluating the achievements of measures the S&T Basic Plans for HRST (FY2003)"

60% or more of managers recognize that the fixed-term appointment promotes the mobility of researchers and is effective in promoting R&D activities.

# 10 . Japanese HRST⑤

## Increase of mobility by types of institutions

**Q: Do you think that mobility of researchers has increased comparing with it three-year earlier ?**



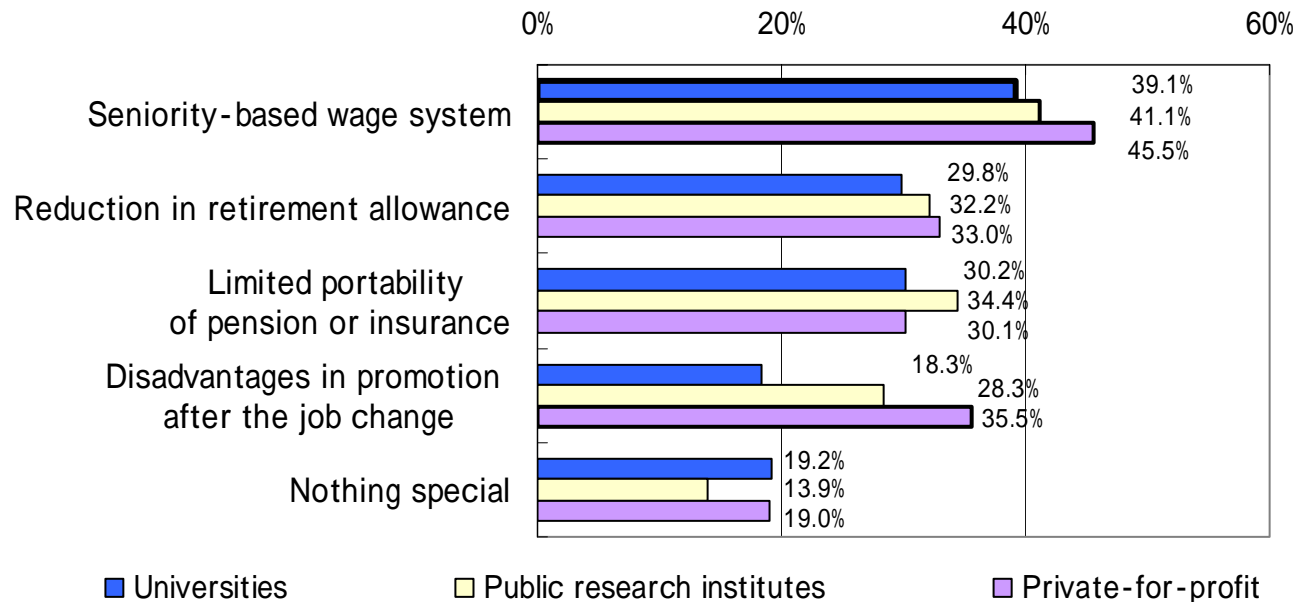
Source: NISTEP “Questionnaire survey of research managers on the evaluating the achievements of measures the S&T Basic Plans for HRST (FY2003)”

Mobility of researchers seems to have increased more in universities and public institutes than in private-for-profit.

# 11 . Japanese HRST⑥

## Barriers to mobility

**Q: What factors prevent Japanese researchers from moving from one organization to another?**



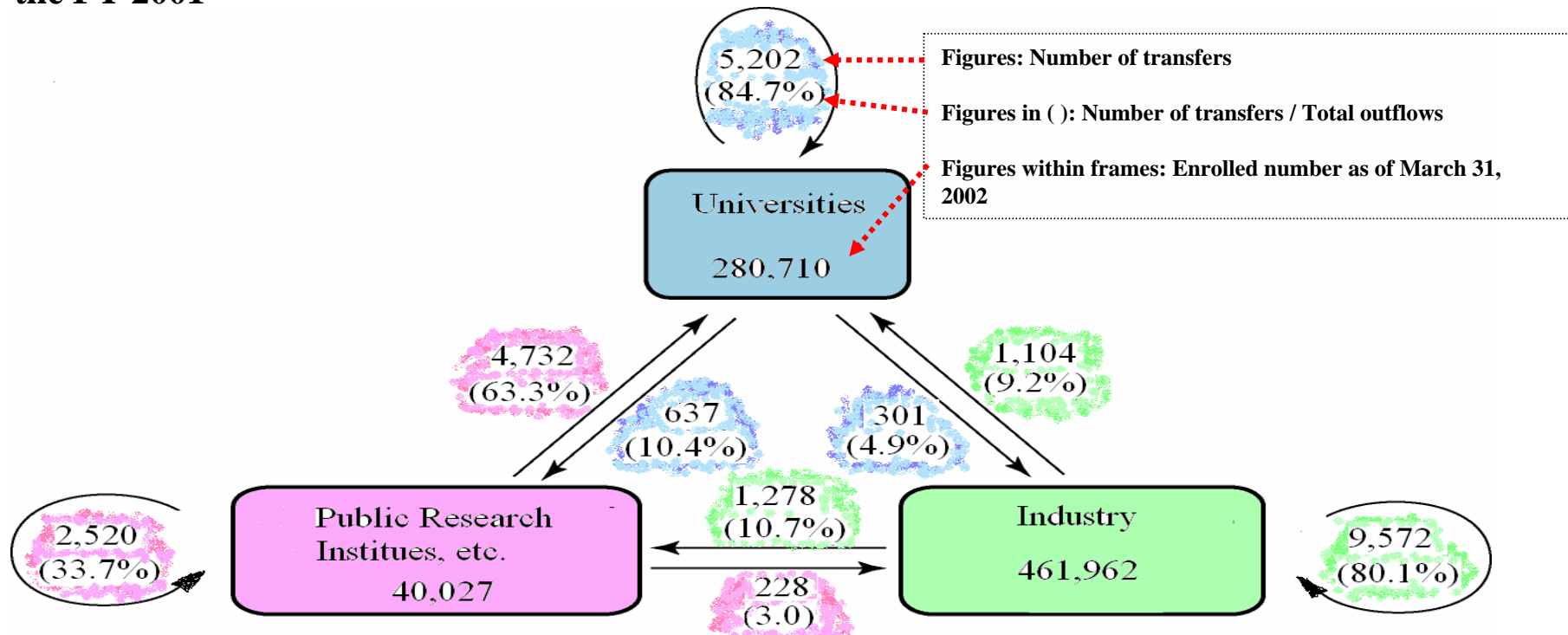
Source: NISTEP “Questionnaire survey of research managers on the evaluating the achievements of measures the S&T Basic Plans for HRST (FY2003)”

- ( 1 ) “Seniority-based wage structure” is considered as major disadvantage by managers of universities, public institutes and private-for-profit.
- ( 2 ) “Disadvantages in promotion after job change” is the major obstacle in private-for-profit.

## 12. Japanese HRST ⑦

### Mobility across and within Sectors

**Mobility of researchers among universities, national research institutes and industry during the FY 2001**



\*1: Social sciences and humanities included

\*2: Enrolled number at universities also includes graduate students in doctorate programs

Source: MPHPT, "The survey of Research and Development FY 2002"

- (1) Most HRST have changed their jobs within the same sectors, in Japan.
- (2) Both at "academic institutions" and "private-for-profit", the ratio of job-changes within the sector is over 80%.

# 13. Japanese HRST ⑧ Employment Sectors ①

Ratio of doctorate holders by employment sector in Japan and the United States



Source: "Comparative Research on Actual Conditions of Doctorate Recipients between Japan and U.S.", March 2004, MEXT

- (1) Comparing with U.S., the employment of doctorate recipients by academic institutions is high. The ratio in Japan is higher than that in U.S., by 7 points.
- (2) The employment by private-for-profit companies is rather low. The ratio in Japan is lower than that in U.S., by 17 points.

## 14 . Japanese HRST ⑨ Employment Sectors ②

### Correlation between the Field of doctorate and the Ratio by employment sector

Field of doctorate	Ratio by employment sector (%)	
	Universities	Private-for-profit
Science	66.8	16.5
Engineering	53.5	29.4
Agriculture	55.8	16.9
Pharmacy	45.0	36.7

Source: "Comparative Research on Actual Conditions of Doctorate Recipients between Japan and U.S.", March 2004, MEXT

To compare according to field of doctorate, in "private-for-profit", the personnel receiving their doctorates at pharmacy has been employed by the highest ratio, as of 36.7%.

## 15 . Japanese HRST ⑩

### Expectation on the Roles of Doctorate Recipients

- (1) Through interviews, we have disclose Japanese companies, views and expectations for doctorate recipients.
- (2) For doctorate recipients, companies hope that doctrates are capable of working as “Principal Investigator” with R&D management capability, as well as with “Specialist” of respective fields.
- (3) Especially, in pharmaceutical companies, the expectation for “Principal Investigator” is high.



## 1 6 . Questions for Better cultivation of HRST

- ( 1 ) What are key points for “diversifying occupations and employment sectors for Japanese HRST” ?
- ( 2 ) “Enhancing the capability of doctorate recipients to play the role of Principal Investigator ( PI ) ” is one of the key points.
- ( 3 ) Widening the views of doctorate recipients to a wider variety of professional opportunities is another important issue.