University – Industry Collaboration in Education - Situation in Japan -

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Outline of Presentation

I Role of MEXT in Higher Education
II Historical Background – Human Resource Development and University-Industry Collaboration in Japan
III Recent Challenges, Necessity of collaboration in education
IV Competencies to be acquired in higher education, and Expectation of Industry
V Policies to promote university-industry collaboration in Education
VI Issues and Challenges
I  Role of MEXT in Higher Education

◆ Planning of higher education policy
◆ Grants permission of the establishment of higher education institutions
◆ Funding national universities (management expenses grants, facilities maintenance grants)
◆ Support education reform of national, public, and private universities through various programs
◆ Promote private schools through tax incentives, subsidies, and administrative guidance and advice
◆ Promote internationalization of universities and student exchange etc

MEXT assumes overall responsibility for higher education system, in university-industry collaboration, cooperates with METI (Ministry of Economic Trade and Industry)
Historical Background

II Historical Background (1)
- Human Resource Development and University-Industry Collaboration in Japan

Human Resource Development from postwar and high economic growth period to early 1990s

- Graduates of departments of science and engineering, colleges of technology generally meet the expectation of industry, contributing to high economic growth.

- Overall, the quality of university education had not been considered as a critical issue under several conditions that characterized Japanese labor market and employment environment.
**II Historical Background (2)**

- **Human Resource Development and University-Industry Collaboration in Japan**

*Unique conditions in Japan*

- Continuing economic growth ⇒ high labor demand ⇒ competition to recruit and retain workforce intensified
- Life time employment and promotion by seniority
- In-house training within enterprises
- Package recruiting system (fresh graduates start their career in April right after the graduation)
- Highly selective process of university entrance ⇒ indicator of graduates’ basic academic / cognitive skill

*Companies weigh prestige of universities (selectivity)

Weak attention to “learning outcomes”*
Development of University–Industry Collaboration

Collaboration in R&D has substantially advanced in the last two decades as S&T / innovation policy develops.

【Legal Framework】
- S&T Basic Law (1995)
- The Law on Promotion of Tech Transfer
- S&T Basic Plan 1st(1996-2001) ~ 4th(2010-2014) etc

【Government Policy Measures】
- competitive funding for joint R&D, support for establishing TLO (Tech Transfer organization), supporting university start-ups, forming innovative regional clusters etc

Tangible Results (drastic increase of joint R&D projects, tech transfer from university to industry, university start-ups etc)
History of Industry-University Collaboration in the context of S&T policy

1st Science & Technology Basic Plan
- 1996
  - "The Law on Promotion of Technology Transfers from U. to I.”
- 1997
  - "The Law on Special Measures for Industrial Revitalization”
- 1998
  - Establishment of TLOs
- 1999
  - Japanese “Bayh-Dole Act”

2nd Science & Technology Basic Plan
- 2000
  - "The Law on Promotion of Technology Transfers from U. to I.”
- 2001
  - "The Law on Special Measures for Industrial Revitalization”
- 2002
  - "The Law on Special Measures for Industrial Revitalization”
- 2003
  - "The Annual IP Promotion Plan”
- 2004
  - "National University Reform”
- 2005
  - "Innovation 25”
- 2006
  - Amendment of “The Fundamental Law of Education”

3rd Science & Technology Basic Plan
- 2007
  - "The New Growth Strategy”
- 2008
  - Boost public and private sector R&D investment to over 4% of GDP in 2020

4th Science & Technology Basic Plan
- 2009
  - "Innovation 25”
- 2010
  - "The Law on Special Measures for Industrial Revitalization”
- 2011
  - "National University Reform”
- 2012
  - "Innovation 25”
- 2013
  - "National University Reform”
- 2014
  - "Innovation 25”
- 2015
  - "National University Reform”
- 2016
  - "Innovation 25”
- 2017
  - "National University Reform”
- 2018
  - "Innovation 25”
- 2019
  - "National University Reform”
- 2020
  - "Innovation 25”
Development of University–Industry Collaboration

- Collaboration in R&D contributes to enhancing the quality of education by offering faculty and students an opportunity to learn practical issues and needs of industry. ⇒ but only limited to some departments of science and engineering.

What about collaboration in education?

- Until recently, policy initiative at the national level had been not so strong, compared with S&T policy.
- Collaboration activities by individual motivated faculty members, but sporadic…
Necessity to enhance the quality of higher education through collaboration with industry has become highlighted in the last decade.

**WHY?**

- Knowledge-based economy ⇒ need to create innovation ⇒ skill gap (creative thinking, problem solving, interdiciplinarity etc)
- Prolonged recession ⇒ enterprise cannot sustain lifetime employment, less capacity for in-house training
- Rise in the advancement rate to higher education ※(57.8% in 2010 as compared with 10.3% in 1960 ※university, junior college, college of technology)
- Youth unemployment rate rise, “marginal university” ⇒ need to develop students’ employability
- Emerging workforce demand (medical services, nursing care, tourism, environment etc)
IV Competencies to be acquired in higher education, and Expectation of Industry

【Expectation of Industry】
◆ In general, industry values generic competencies and mindset (positive attitude, independence, cooperativeness etc)
  ⇒ expect university to foster these competencies
◆ In some fields, needs of specific knowledge and skills (mostly in science and engineering, such as IT, chemistry etc)

【Government attempts to specify competencies】
◆ MEXT・・・ “Competencies to be acquired through undergraduate program (bachelor’s abilities)”
◆ METI・・・ “Fundamental Competencies for Working Persons”
◆ Also, a lot of discussions on global human resource
“Competencies to be acquired through bachelor’s abilities” (The Central Council for Education)

- In December 2008, the Central Council for Education (an advisory body for Minister of MEXT) submitted a report titled “Towards the enhancement of undergraduate education,” aiming to realize internationally competitive undergraduate education. The report indicates “competencies to be acquired through undergraduate programs (bachelor’s abilities)” for reference to university in clarifying policies of undergraduate programs.

< Policies to be clarified in every university >

Policy for awarding academic degrees
- To clarify the policy for awarding academic degrees and education and research purposes

Policy for curriculum
- To work out systematic educational content and instruction
- To secure students’ learning activity and appropriately evaluate their performance

Policy for acceptance of admitted students
- To clarify the criteria for selecting students
- To conduct admission process properly, especially in the case of recommendation

< Competencies to be acquired through undergraduate abilities >
Reference guideline for learning results common among bachelor courses – it is recommended that university clarify its policy for awarding academic degrees based on each item in such reference guidelines.

1. Knowledge / Understanding – in addition to systematic understanding of the basic knowledge of a specific field of major, understanding of many different cultures, human culture, society and nature
2. General-purpose skills – skills for intellectual activities as well as professional and social life
   Communication skills, numerical competence, IT literacy, logical thinking, and problem solving skills
3. Comprehensive learning and its application – the ability, with which a person can comprehensively utilize the knowledge, skills, behaviors and other experience acquired to date to successfully apply such experience new issues
In February, 2006, the Ministry of Economy, Trade and Industry defined the basic abilities required in working together with various people in the workplace and in the local communities as “Fundamental Competencies for Working Persons” which consist of the following three competencies (12 competency factors) at a committee comprising of intellectuals in the businesses and universities (Chaired by Prof. Yasuo Suwa of Hosei University Graduate School).

< 3 Competencies / 12 Competency Factors >

**Ability to step forward (action)**

—Ability to step forward and act persistently even if you fail—

- Initiative
  Ability to initiate things proactively

- Ability to influence
  Ability to influence and involve others

- Execution skill
  Ability to set goals and execute with conviction

**Ability to think through (thinking)**

—Ability to question and think through—

- Ability to detect issues
  Ability to analyze status quo and clarify issues

- Planning skill
  Ability to clarify procedures to solve issues and prepare

- Creativity
  Ability to create new values

**Ability to work in a team (teamwork)**

—Ability to collaborate with various people to achieve goals—

- Ability to deliver messages
  Ability to deliver own opinions clearly

- Ability to listen closely and carefully
  Ability to listen to other peoples’ opinions carefully

- Flexibility
  Ability to appreciate different opinions and perspectives

- Ability to grasp situations
  Ability to comprehend relationship between yourself and other people as well as things surrounding you

- Ability to apply rules and regulations
  Ability to comply with social rules and keep promises with others

- Ability to control stress
  Ability to deal with the original cause of stress
Importance of “Fundamental Competencies for Working Persons”

In light of the changes in the environment surrounding companies and young people, in addition to “basic academic skills” and “expertise knowledge,” the ability to utilize such skills and knowledge as well as conscious development of the basic abilities required in working together with various people (Fundamental Competencies for Working Persons) will become more important than ever.

- **Ability to utilize basic academic skills and expertise knowledge** (Fundamental Competencies for Working Persons)
- **Basic academic skills**
  - (Reading, writing, arithmetic, basic IT skill, etc.)
- **Expertise knowledge**
  - (Ability to solve issues, execution skills, teamwork, etc.)
- **Humanity, basic habits in life**
  - (Considerateness, public spirit, ethics, basic manners, doing personal things perfectly by yourself, etc.)
Development Activities of “Fundamental Competencies for Working Persons” by the Ministry of Economy, Trade and Industry

(1) Development and Evaluation Model Activities of Fundamental Competencies for Working Persons (Since FY2007)

- Establishes a systematic educational curriculum for university students to develop and evaluate “Fundamental Competencies for Working Persons” and implement model activities to spread such activities within the school.
- In FY2009, 28 universities applied from all over the country, 12 of which were adopted as model universities.
- Practical studies to introduce PBL (Project Based Learning) which provide issues in collaboration with the businesses and government as well as development and evaluation using seminars and general subjects have been implemented.
- It is also important to develop an effective evaluation system (competency).
- The curriculum to develop “Fundamental Competencies for Working Persons” conducted by model universities and their innovative ideas will be summarized to create a “Reference Book” to promote such activities to universities nationwide (the book was published in 2010).

(2) Holding the Research Group (Competition) for Development of Fundamental Competencies for Working Persons (Since FY2007)

- Curriculums to develop “Fundamental Competencies for Working Persons” and their achievements are presented by students and the winners are selected.
- Based on stories that students overcame difficulties and accomplished significant growth, an effective method to develop “Fundamental Competencies for Working Persons” and educational measures are discussed.
- A total of 100 universities participated in a competition held in March 2011 from all over the country.
V Policies to promote university-industry collaboration in education (1)

MEXT and METI jointly launched policy initiatives to provide venue for university-industry dialogue

1. The Industry-Academia Partnership for Human Resource Development (launched in October 2007)
   - consists of representatives of business and university organizations
   - establishes sub-committee to discuss the issues of specific fields

2. The Roundtable for Human Resource Development through Industry-University Collaboration (launched in July 2011)
   - consists of top executives of 20 global companies (ex. Toyota, Hitachi, Panasonic etc) and 12 top-level research universities
   - aims at fostering high-end global / innovative human resource
   - expected to map out action plan in the summer 2011
This partnership is a policy initiative that provides venue for discussion and activities, in order to strengthen collaboration between industry and university in human resource development. Through discussions, both industry and university are expected to build mutual understanding, and take concrete measures.

**<General Meeting>**

<table>
<thead>
<tr>
<th>General Meeting Members</th>
<th>Sectional Committee Members</th>
</tr>
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<tbody>
<tr>
<td><strong>Industry</strong>: Representatives from economic organization (Keidanren, Japan Association of Business Executives, Japan Chamber of Commerce and Industry)</td>
<td>Chars of each sectional committee: both from industry and university</td>
</tr>
<tr>
<td><strong>University</strong>: Representatives from university organizations (associations of national, public, and private universities)</td>
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**<Sectional Committees>**

- Chemistry
- Machine
- Material
- Natural Resource
- IT
- Electrical Electronics
- Nuclear Energy
- Management Operation
- Bio

**Global Human Resource Development**
Expectations for University Actions

1. Enhance education which reflects the practical need of society
2. Foster human resource with skills necessary in globalized society
3. Assure the quality of university graduates
4. Invest in faculty development, and establish evaluation mechanism which values faculty’s effort to improve education

Expectations for Industry Actions

1. More recruitment of doctors (science/engineering) and masters (arts, social science)
2. Correct problematic recruitment activities (too early, too long disturbing university education)
3. Accept more interns, collaborate in practical education such as PBL
4. Recognize the importance of academic learning
5. Develop career models of high-skilled human resource (doctors)
Policy measures (1)

– **Promotion of Internship**

- Distribute the guideline of internship explaining procedure and important points in implementing internship program, provide information of good practices
- Selective financial support to universities for developing long-term internship programs (2005-2010)
- “The New Growth Strategy” (Cabinet decision in June 2010) sets the target by 2020 “the rate of universities providing internship to 100%”
The number / the rate of universities implementing internship (※) has steadily increasing. About 90% of internship programs take less than 3 weeks, while only 6.6% takes more than 1 month.

※"implementing" means that internship is incorporated in university education so that students can get course credits.
**Policy measures (2)**

- **GP (Good Practice) projects**

    - MEXT has implemented various GP projects to financially support universities’ effective efforts to improve the quality of education.

    - Various programs, some of which focus on university-industry collaboration

      <programs>
      - Program for Enhancing Students’ Employability (2010 ~ )
      - Program for Training Leading IT Specialists (2006 ~ 2010)
        ⇒ Strong demand of industry ⇒ currently requesting budget for a renewed project of developing IT specialists
      - Program for Training Highly Specialized Professional at Professional Graduate Schools (2007 ~ 2009)
      - Leading Program of Doctoral Course (2011 ~ ) etc
Program for Enhancing Students’ Employability

The program supports activities to enhance students’ employability such as PBL in collaboration with industry.
- 180 applications selected out of 441
- Approximately 20 million yen per year for each institution
- 5 years of support

< Examples of Universities joining the program >

**Kyoto Sangyo University**
Aim at developing courses that integrates theory and practice in collaboration with industry
- Working experience at local SME
- Practical internship and field interview
- "industry-university hybrid course" in which university students and younger employees study together
- PBL

**Nagahama Institute of Bio-Science and Technology**
In collaboration with local chamber of commerce and industry, start practical classes
- PBL collaborating with local companies and residents in which students present business proposals, city planning etc
- OJT classes in which students learn from real experience of companies (challenges, business negotiations etc)
Purpose
Tsukuba University, in collaboration with other universities and industry (Keidanren), aims to become world-class institutions in fostering IT specialist in embedded software and enterprise system.

Specialist to be developed
- Leading specialist in software development in the field of embedded software and enterprise system
- Contribute to enhancing global competitiveness of companies

Number of Students etc
- Master's student (43 students enrolled in 2009)
- 50 course credits (2 years)

Planning of Education Programs
- Appoint specialists dispatched from industry (Hitachi and NTT data) as full-time faculty, and engaged them in planning and developing curriculum
- These full-time faculty took charge of PBL classes. In addition, industry dispatched 62 specialists as part-time lecturers

Focus on Practical Knowledge / Skills
- Emphasis on practical training
- 7 out of 10 required courses provided in collaboration with lecturers from industry
- In a certain course, students submit deliverable (report, software) instead of academic paper
- Top-level specialists from industry lecture on the trend of IT
- Mid-term / Long-term internship to companies and research institutions at home and abroad (giving credits)
- PBL by lecturers from industry

Evaluation of Students at the time of entrance showed that they had low skills in information system and software engineering that industry values.

Post-project evaluation of students found that students acquired necessary skills and reached the standard of industry demand.

Many graduates got job offer from leading companies.

According to the questionnaires to companies that recruited graduates who finished the course, these graduates are considered to be superior to other graduates in many respects.
VI Issues and Challenges

- Matching of university’s interest and demand of industry
- Insufficient incentives of faculty to improve education (evaluation based on research performance, organizational culture)
- Recruitment activities, inflexible labor market
- Education in specialty and career development
- Political constrains
Thank you very much