Industrial Engineering and Management Science in Korea

Prof. Jinwoo Park
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Seoul National University
Presentation Agenda

1. Korea (South Korea) Overview
2. KIIE and KORMS
3. Korean IE Education
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1. Korea (South Korea) Overview
2. KIIE and KORMS
3. Korean IE Education
South Korea overview
(Republic of Korea)

Geographically 3 big neighbors (China, Russia, Japan), Interests by 4 big countries (above 3 + USA)

Until mid 19th century, Korea’s only neighbors were China and Japan. In old world, these 3 countries have been getting along very well except couple of conflicts until 1890’s.
South Korea overview (Republic of Korea)

- GNI:
  - **US$ 1.129 Trillion** (2012)
  - **US$ 22,708 Per Capita** (2012)
- Major Industrial Products:
  - Semiconductors, automobiles, ships, consumer electronics, mobile telecommunication devices, industrial equipment, steel, and chemicals
South Korea Overview (Republic of Korea)

- Political System:
  - Republic (5 year single term presidential system)
- Life Expectancy:
  - Male 77.7 years, Female 84.5 years (2011)
- Religion: Among 51 million population
  - 10.7 million Buddhists
  - 13.8 million Christians (8.7 mil. Protestants)
- Still a divided country, which happened after WW II. North Korean population is about 25 million and Korea had been one country since 670~1910AD when it became a victim of imperialism.
South Korea Overview: Educational System

As of 2010, 411 institutions of higher learning, with a total of 3.64 million students and 77,697 faculty members.
Economic History of South Korea

GNI per capita: 255(1970) to 22,708 US$
Historical Overview of Korean Education System and Economic Growth

**National Income**

<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
<th># of universities</th>
<th># of university students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>1</td>
<td>1,000*</td>
<td></td>
</tr>
<tr>
<td>1955</td>
<td>44</td>
<td>78,649</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>52</td>
<td>92,930</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>70</td>
<td>105,643</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>71</td>
<td>146,414</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>72</td>
<td>208,986</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>75</td>
<td>403,989</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>100</td>
<td>931,884</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>107</td>
<td>1,040,166</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>131</td>
<td>1,187,735</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>161</td>
<td>1,665,398</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>173</td>
<td>1,859,639</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>179</td>
<td>2,028,841</td>
<td></td>
</tr>
</tbody>
</table>

**Growth in Higher Education after Independence**

*)During the colonial period there was only one 4 year university. No science and technology graduate before the break out of WW2. Even among this number, 70% of students were Japanese. Very limited opportunity in higher education for 25 million Korean people at that time.*
Prof. JW Park’s Experience

- Elementary School (1958~64: 60+ pupils /class, 3 classes/day*) <9am~12pm, 12pm~3pm, 3pm~6pm>, total 5,500 pupils in ‘Midong’ Elementary School

- Middle and High School (1964~70: 60 students /class)

- University (Entered as Mechanical Engr. in 1970., graduated as Industrial Engr. in 1974)—2nd Graduate Class of Dept. of Ind. Eng. (only 3 professors).

- Graduate School
  - KAIST, Mar., 1974~Feb., 76, M.S. (2nd Graduate Class) (Only 2 professors when began studying, 3 new professors recruited at graduation time)
  - Univ. of California, Berkeley 1980~85, D.Eng. (20 professors).


*) Since number of teachers were very small 10
1. Korea (South Korea) Overview
2. KIIE and KORMS – role of professional organizations in enhancing the status of new discipline
3. Korean IE Education
KIIE: Korean Institute of Industrial Engineers

- The KIIE was established in 1974 as an academic institute to promote the practice of technology and theoretic development of industrial engineering.
- Started publishing the Journal of the KIIE in the same year.
- Home page: http://kiie.org
- Membership: 7199 including organizational members
  - Student members: 3980
  - Regular members excluding students: 3219
  - Life time members: 562
KORMS: Korea Operations Research and Management Science Society

- The KORMS was established in 1976 as a multidisciplinary academic institute consisting of industrial engineers, mathematicians, statisticians, other engineers, social scientists, people in industry and military.
- Started publishing the Journal of the Korean Operations Research Society in the same year.
- Home page: http://www.korms.or.kr
- Membership: 3608 including organizational members
  - Student members: 1121
  - Regular members excluding students: 2487
  - Life time members: 683
KIIE/KORMS- Domestic Activities

• Both institutes began publishing applications of the fields in the 1980s (KORMS in 1984, the Applications of Operations Research, KIIE in 1988, IE Interfaces) in addition to their regular theoretical academic journals.

• Since establishment, both organizations have had two conferences every year (spring and autumn conferences).

• Beginning from 1986, Joint Spring Conference by two organizations have started. KIIE or KORMS hosts the conference by taking turns each year and the tradition continues up to now.
The KIIE/KORMS Joint Conference in June, 2010

In Korea, thanks to the sponsorship of the ministry of education and science, all presentations of important academic conferences are video recorded and available for viewing on-line at later times. And above clip shows presidential speeches of our joint conference.
The KIIE/KORMS Joint Conference in June, 2010 -
invited speaker, Mr. D.H. Kim, president of LG CNS
KORMS- Domestic Activities

• In 1995, began publishing the International Journal of Management Science, an English Journal two times a year (now 3 times a year).

• Some prominent Academic Societies in Korea, that started out as a small study group of KORMS in the 80’s and 90’s:
  • Korea Society of Management Information Systems
  • Korea Business Intelligence/Data Mining Society
  • Korea Intelligent Information Systems Society (formally Korea Expert System Society)
KORMS- International Activities

• In 1976, first Asian Conference related to Operations Research was held in Taiwan, the Pacific Conference of Decision Analysis.

• In 1984, APORS (Association of Asian-Pacific Operational Research Societies within IFORS) was formed.
  • China, Hong Kong, India, Japan, Korea (Chair Country elected) and Singapore from Asia
  • Australia, New Zealand from Oceania.

• Prof. Iri of Japan, then V.P. of the IFORS was one of the main contributors for the birth of the APORS.
KORMS- International Activities

• In 1988, the 1st APORS (Association of Asian–Pacific Operational Research Societies) Conference took place in Seoul, Korea, and the hosting institute was the KORMS. And APORS conferences are being held in every three years. APORS 1991 and APORS 2012 conferences were held in China.

• In 2000, KORMS hosted the INFORMS/KORMS Joint Conference with the theme of Information and Knowledge Society of the 21st Century.

• KORMS was elected as the secretariat country of APORS in 2012 and is responsible for the maintenance of APORS home page. Next APORS Conf. will be hosted by Malaysia in 2015, which is the presidential country until 2015.
APORS 1988

PROGRAM

APORS '88

FIRST CONFERENCE OF THE ASSOCIATION OF ASIAN-PACIFIC OPERATIONAL RESEARCH SOCIETIES WITHIN IFORS

AUGUST 24-26, 1988
SHERATON WALKER HILL HOTEL
SEOUl, KOREA

Organized by
APORS (Association of Asian-Pacific Operational Research Societies within IFORS)
KORS (Korean Operations Research and Management Science Society)
APORS 1991

OF THE
SECOND CONFERENCE OF
THE ASSOCIATION OF
ASIAN-PACIFIC
OPERATIONAL RESEARCH
SOCIETIES (APORS)
WITHIN IFORS
BEIJING 1991

OR: Making Decisions for Winning Victory

CHIEF EDITOR Cang-pu WU

PEKING UNIVERSITY PRESS
2000 INFORMS/KORMS Joint Conference
KIIE- International Activities


• Ramada Plaza Jeju Hotel, Jeju Island, Korea.
Presentation Agenda

1. Korea (South Korea) Overview
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Seoul National University

Colleges & Schools
As of April 1, 2013

16 Colleges with 84 Departments for Undergraduates
• Humanities, Social Sciences, Natural Sciences, Agriculture and Life Sciences, Business Administration,
  Education, Engineering, Fine Arts, Human Ecology, Liberal Studies, Law, Medicine, Music, Nursing, Pharmacy,
  Veterinary Medicine

1 Graduate School with 99 Programs
• Master's Program: 70 Programs and 28 Interdisciplinary Programs
• Doctoral Program: 71 Programs and 28 Interdisciplinary Programs

9 Professional Graduate Schools
• Business, Environmental Studies, Convergence Science and Technology, Dentistry, International Studies, Law,
  Medicine, Public Administration, Public Health
Seoul National University

Faculty
As of April 1, 2013

Number of Faculty 5,361
  - Professors 1,306
  - Associate Professors 412
  - Assistant Professors 177
  - Professors Emeriti 815
  - Professors (Foundation Fund) 262
  - Humanities Korea (HK) Professors 21
  - Humanities Korea (HK) Research Professors 37
  - Visiting Professors 122
  - Full-time Research Professors 138
  - Full-time Lecture Professors 63
  - Adjunct Professors 659
  - Part-time Lecturers 1,349

Students
As of April 1, 2013

Number of Enrolled Students 28,011
  - Undergraduate Students 16,712
  - Graduate Students in Master's Program 8,002
  - Graduate Students in Doctoral Program 3,297

Number of International Students
  - International Students in Degree Programs 2,881
    - Undergraduate Students 1,029
    - Graduate Students in Master's Program 1,093
    - Graduate Students in Doctoral Program 759
  - International Exchange Students
    - 587 as of March 2010 ~ Feb. 2011
    - 622 as of March 2011 ~ Feb. 2012
    - 683 as of March 2012 ~ Feb. 2013

Degrees Conferred in 2012
  - Bachelor's Degrees Conferred 3,466
  - Master's Degrees Conferred 2,893
  - Doctoral Degrees Conferred 1,138
  - Honorary doctoral degrees conferred since 1947 110
### Faculty Members

<table>
<thead>
<tr>
<th>Department</th>
<th>Professors</th>
<th>Associate professors</th>
<th>Assistant professors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mechanical and Aerospace Engineering</td>
<td>33</td>
<td>9</td>
<td>5</td>
<td>47</td>
</tr>
<tr>
<td>Department of Chemical and Biological Engineering</td>
<td>25</td>
<td>2</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>Department of Materials Science and Engineering</td>
<td>35</td>
<td>5</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>Department of Electrical and Computer Engineering</td>
<td>54</td>
<td>5</td>
<td>7</td>
<td>66</td>
</tr>
<tr>
<td>Department of Computer Science and Engineering</td>
<td>24</td>
<td>5</td>
<td>2</td>
<td>31</td>
</tr>
<tr>
<td>Department of Energy Systems Engineering</td>
<td>15</td>
<td>5</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>Department of Architecture and Architectural Engineering</td>
<td>12</td>
<td>2</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Department of Industrial Engineering and Novel Architecture</td>
<td>23</td>
<td>9</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>Department of Civil and Environmental Engineering</td>
<td>20</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>241</strong></td>
<td><strong>44</strong></td>
<td><strong>33</strong></td>
<td><strong>318</strong></td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>Created as Department of Production and Mechanical Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>Changed to Department of Industrial Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>First Bachelor’s Degree Awarded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>First Master’s Degree Awarded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>Moved to Building 35, Gwanak Campus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>First Ph.D. Degree Awarded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Moved to Building 39 (Current Location)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>Created Technology Management &amp; Policy Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>In the Process of Becoming Independent Admission Entity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Enrolled Student- Bachelor(146), Master(68), Doctorate(55)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## Curriculum of IE Department of SNU

<table>
<thead>
<tr>
<th>Course Title (Mandatory)</th>
<th>Course Title (Formally Mandatory)</th>
<th>Course Title (Elective)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work System Design</td>
<td>Computer Integrated Manufacturing</td>
<td>Service Engineering</td>
</tr>
<tr>
<td>Intro to Computing</td>
<td>Cost Accounting</td>
<td>Simulation</td>
</tr>
<tr>
<td>Production Control</td>
<td>Management Information Systems</td>
<td>Management of Technology</td>
</tr>
<tr>
<td>Engineering Economy</td>
<td>Linear Programming</td>
<td>Data Mining</td>
</tr>
<tr>
<td>Human Engineering</td>
<td>Production Systems Design</td>
<td>Product Development Process</td>
</tr>
<tr>
<td>Operations Res. I</td>
<td>Operations Res. II</td>
<td>Human Interface Design</td>
</tr>
<tr>
<td>Database Systems</td>
<td>Manufacturing Process Design</td>
<td>Internet Applications</td>
</tr>
<tr>
<td>Quality Management</td>
<td>Advanced Statistics</td>
<td>Optimization Models</td>
</tr>
</tbody>
</table>
## Curriculum of IE Department of SNU

- **Graduate Courses**—37 courses including

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Course Title</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of Scheduling</td>
<td>Dynamic Systems</td>
<td>Reliability</td>
</tr>
<tr>
<td>Stochastic Process</td>
<td>Decision Analysis</td>
<td>Internet Svc Eng.</td>
</tr>
<tr>
<td>Engineering Economy</td>
<td>Theory of Forecasting</td>
<td>Investment Risk Mgt.</td>
</tr>
<tr>
<td>Integer Optimization</td>
<td>Product/Svc Mgt.</td>
<td>Data Mining Tech.</td>
</tr>
<tr>
<td>Network Optimization</td>
<td>Human Performance</td>
<td>Convex Optimization</td>
</tr>
<tr>
<td>Advanced Topics in Statistical Learning</td>
<td>Enterprise Information Systems Engineering</td>
<td>User–centered Product Design &amp; Development</td>
</tr>
<tr>
<td>Integrated Supply Chain Management</td>
<td>Theory and Res in Technology Innovation</td>
<td>Strategic Planning &amp; Control</td>
</tr>
</tbody>
</table>
Engineering:

The profession in which a knowledge of the mathematical and natural science gained by study, experience and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind.

- ME(Mechanical Eng.), EE(Electrical Eng.), Civil Eng., Ch.E(Chemical Eng.), CE/CS(Computer Eng./Science), IE(Industrial Eng.)
Industrial Engineering (Def. by IIE*): 

Industrial Engineering is concerned with the **design**, **improvement** and **installation** of **integrated systems** of people, **material**, **equipment**, **information** and **energy**.

It draws upon specialized knowledge and skills in the **mathematical**, **physical** and **social sciences** together with the principles and methods of engineering analysis and design to **specify**, **predict** and **evaluate** the results to be obtained from such systems.

IE Symbol suggested by SNU students: Conductor of Engineering Orchestration

*) The Institute of Industrial Engineers (http://www.iienet2.org/)
IE Education for the Future

• Current key themes in Korean Academia
  ➢ Fusion
  ➢ Convergence
  ➢ Sustainability
  ➢ …
Where we are going?

110 years ago

60 years ago

Present

50 years Later?

100 years Later?
Creativity enhancing education

Characteristics of Korean People

- Fast, fast – 빨리빨리
- Scholar revering culture
- Be winner – very competitive society

“KOREA PRODUCTION SYSTEM”
Ubiquitous Computer Society

- Multi-tap: ₩ 5,000
- Grounded Multi-tap: ₩ 8,000
- Individually grounded M-t: ₩ 15,000
- EMI protected M-t: ₩ 660,000

Home Network / Remote Control / Arti. Intelligence

U-Manufacturing

Hospital → Digital Hospital → Mobile Healthcare → Home Healthcare

Ubiquitous Healthcare Infrastructure
u-Laboratory in SNU
u-Laboratory in SNU
Preferred Industrial Engineer

System Mind

Statistics /Economy /Management

IE Expertise

WSD/QM/PPC
Ergonomics
Eng Econ/Fin Eng
Operations Research
C I M Systems
Mfg Process
Database Systems

ICT /Engineering /Technology

Depth+
Breadth+
System Mind+
Warm Heart

Credit::JWPark/HJKim/DMLee
Some people see the present and say why?*

We dream of IE dreams and say why not?

*)modified from George Bernard Shaw’s famous poem, ‘Back to Methuselah.’
Web sites

• Official government site: www.korea.net

• Seoul National Univ.: www.snu.ac.kr

• SNU College of Engineering: eng.snu.ac.kr

• Dept. of Industrial Eng.: ie.snu.ac.kr
Thank you!

Any comments or questions?