

An Investigation on Engineers and  
Technicians (E&T) in State-owned  
Organizations of China

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# Outline

## **I. Review: Present Status on E&Ts**

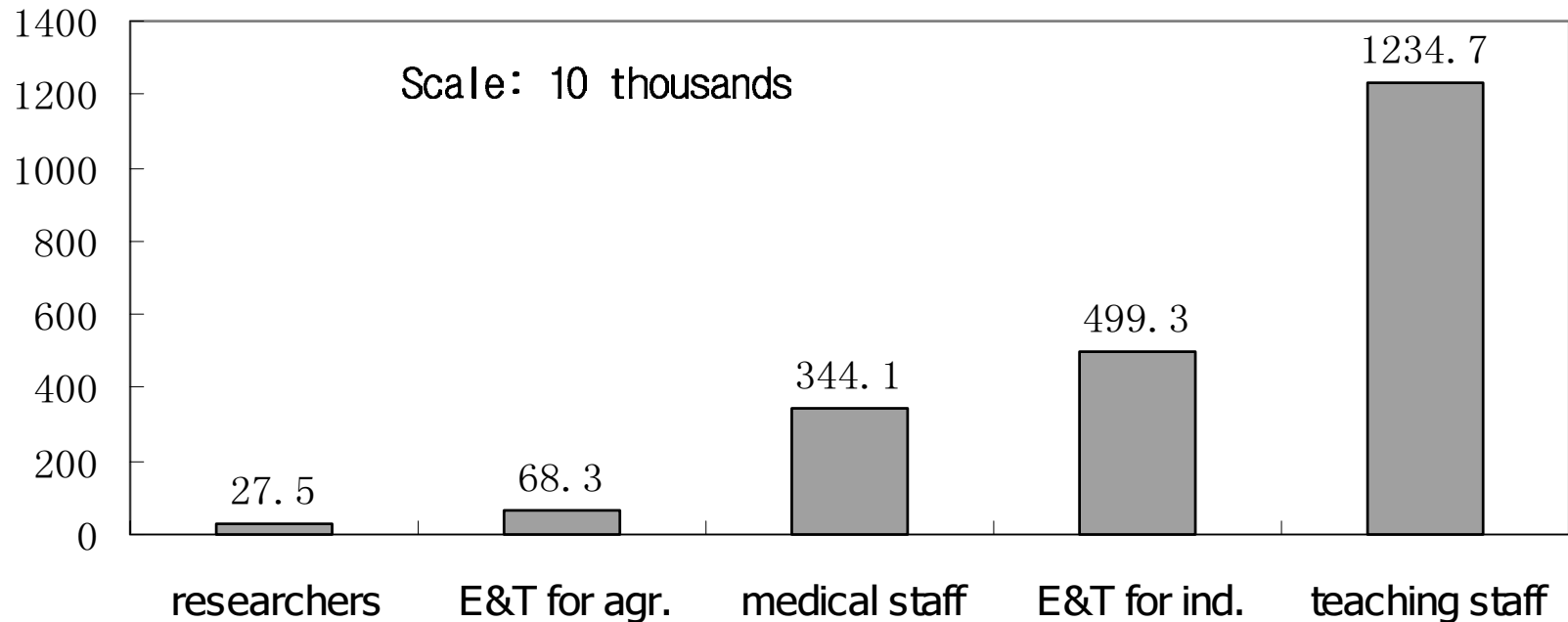
## **II. Investigation: on E&Ts in State-owned Organizations of China**

- **Design**
- **Outcomes**

## **III. Remarks**

# The Present status of E&T in State-owned Organizations of China

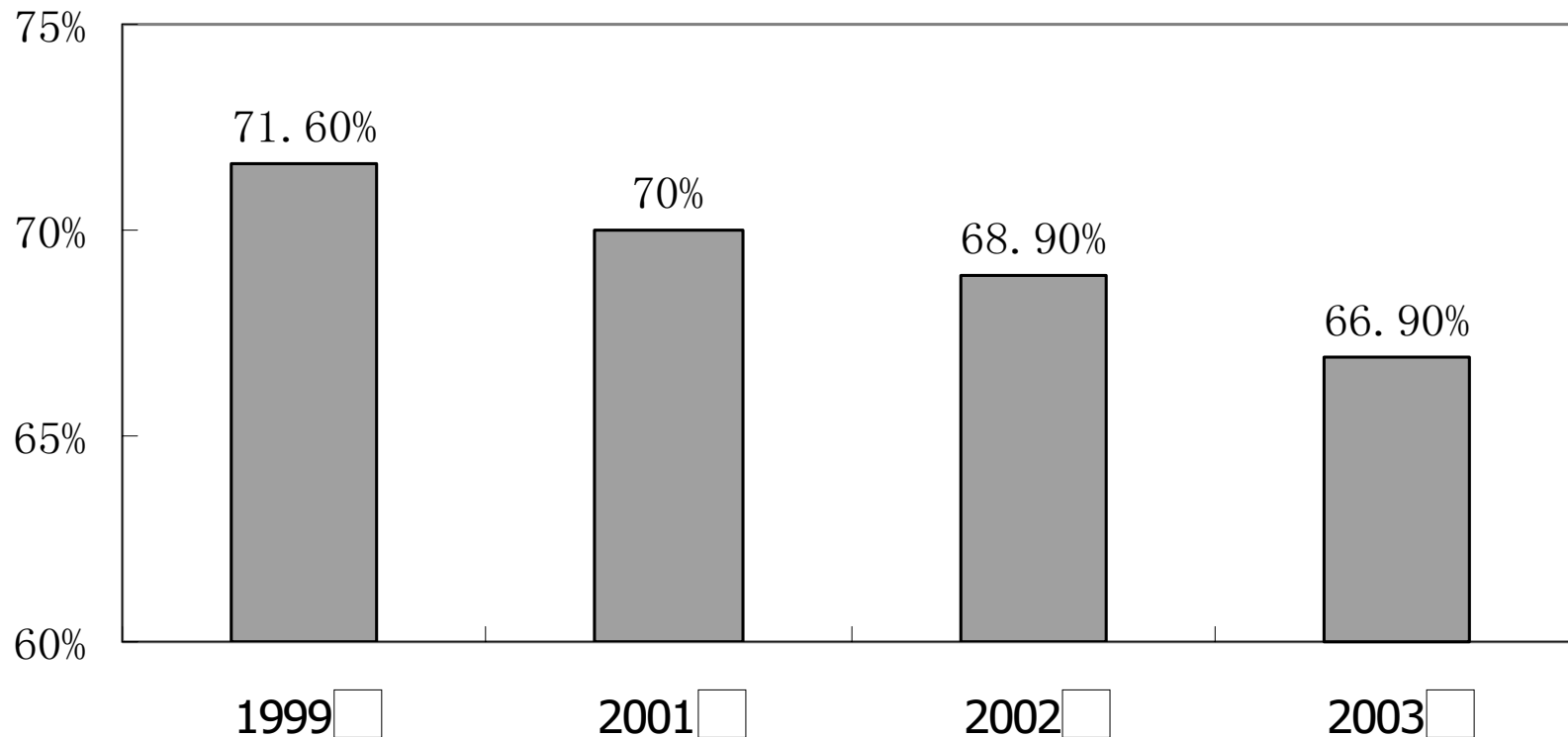
## 1、 Quite a number of E&T



**Chart1: The Distribution of E&T Staff in State-owned Organizations (2003)**

# The present status of E&T in state-owned Organizations of China

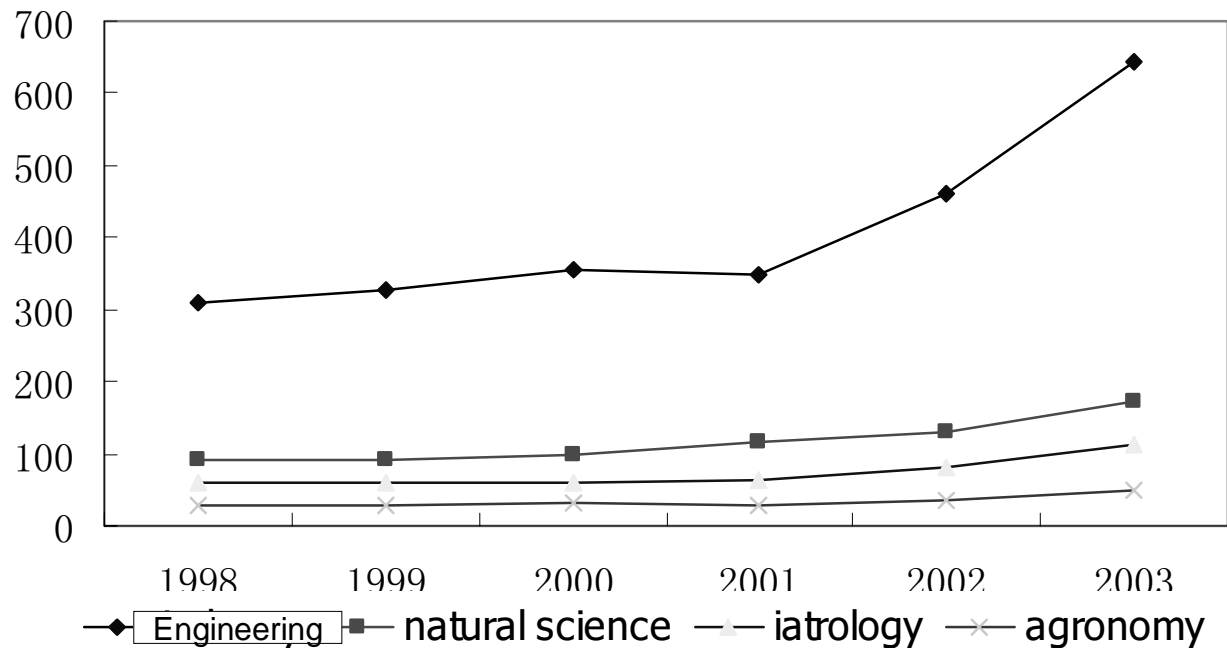
**2、 The percentage of E&T in the total employees in state-owned organizations has been continuously decreasing, with the percentage in non state-owned organizations increasing fast.**



**Chart2: The Percentage of E&T Staff in State-owned Organizations**

# The present status of E&T in state-owned organizations of China

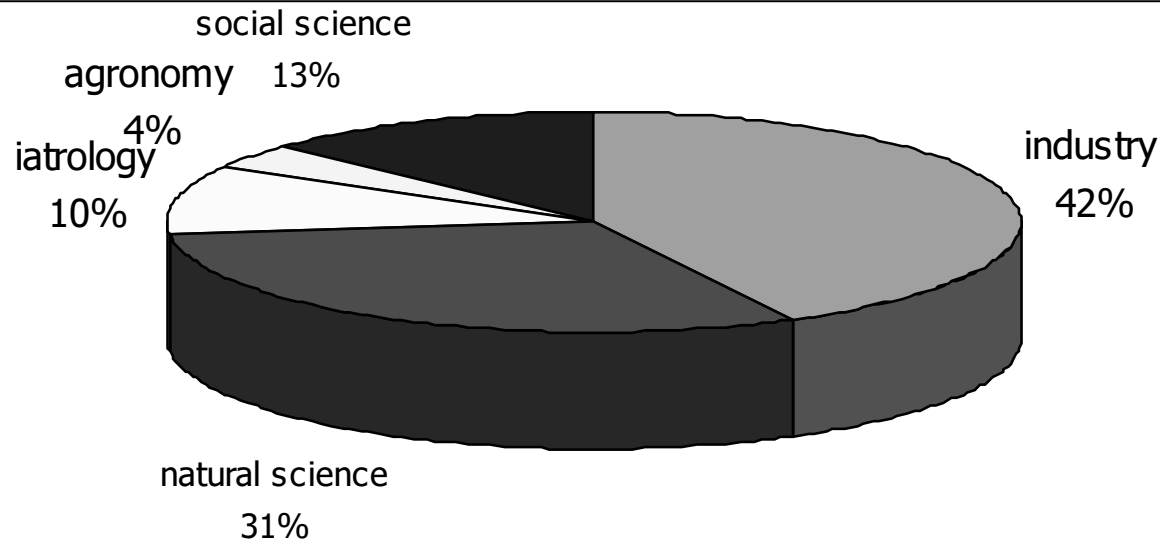
**3 、 Graduates in engineering have doubled from the year 1998 to 2003, increasing fastest in the following four majors.**



**Chart3: The Comparison of Increasing Trend of Graduates in 4 Majors**

# The present status of E&T in state-owned organizations of China

**4 、 42% of the post-doctors majored in engineering, the scale was the largest one (2003) .**



**Chart4: Major Distribution of Post-doctors (2003)**

# The present status of E&T in state-owned organizations of China

5、 The selecting system for outstanding E&T ——members of Chinese Academy of Engineering (CAE), ‘especial allowance’ professionals and prominent experts by central government——has been formed basally.

- **At present, 750 people have been selected as Members of CAS and CAE in our country.**

- **Among the winners of ‘Special Government Allowance’, 46.63% were occupied in the field of engineering, which was the first rate.**

# Conclusion on E&Ts in China

- Quite a number of E&Ts in China
- The percentage of E&Ts in state-owned organizations continuously decreasing, with that in non state-owned organizations increasing
- Graduates in engineering having a very big increase since 1998
- The selecting and training system for outstanding E&Ts formed basally

# Design for the Investigation

This investigation is organized by Chinese Academy of Engineering (CAE), attempting to discover the influential factors to the growth of E&Ts in China and the possible problems.

Eight sub research teams were set up in eight fields:

- Aeronautics and astronautics
- Shipbuilding Engineering
- Information & Electronics
- Architecture
- Petroleum & Chemical Engineering
- Coal Technology
- Agriculture& Forestry
- Medicine.

# Design

## Methods:

- Questionnaire
- Database
- Interview

## Participants:

### **-TOP E&Ts: for Questionnaire, Database and Interview**

- Members of CAE;
- Prominent professionals in E&T;
- Leaders of key program (Eg.863 and so on) ;
- CTO and chief engineers of enterprises

### **-Other E&Ts: only Questionnaire**

# Design

## Objectives for Questionnaire :

	<b>Aeronautics &amp; Astronautics</b>	<b>Shipbuilding Engineering</b>	<b>Information &amp; Electronics</b>	<b>Petroleum and Chemical Engineering</b>	<b>Coal Technology</b>	<b>Construction &amp; Architecture Engineering</b>	<b>Agr.&amp; Forestry</b>	<b>Medicine</b>	<b>total</b>
send out	980	655	800	797	1000	537	600	334	4975
back	862	581	728	761	822	490	397	334	4975
percentage	88%	88.70%	91.00%	95.50%	82.20%	91.20%	66.20%	—	—

# Design

## Database

- 1、 Contents For database

- 1) Demographic variables
- 2) Awards and patents
- 3) Membership of foreign academies or associations
- 4) Undertaking key programs
- 5) Papers included by authoritative academic journals

- 2、 Objectives for database:

	<b>Aeronau -tics and astronau -tics</b>	<b>Shipbuild -ing Engineeri ng</b>	<b>Information &amp; Electronics</b>	<b>Petroleum and Chemical Engineering</b>	<b>Coal Techno -logy</b>	<b>Agriculture &amp; Forestry</b>	<b>Medi -cine</b>	<b>total</b>
<b>NO.</b>	725	175	194	240	236	197	489	1195

# Design

## **Interview**

- Individual interview
- Group focused interview

## Outcome 1— Core Competencies for E&T

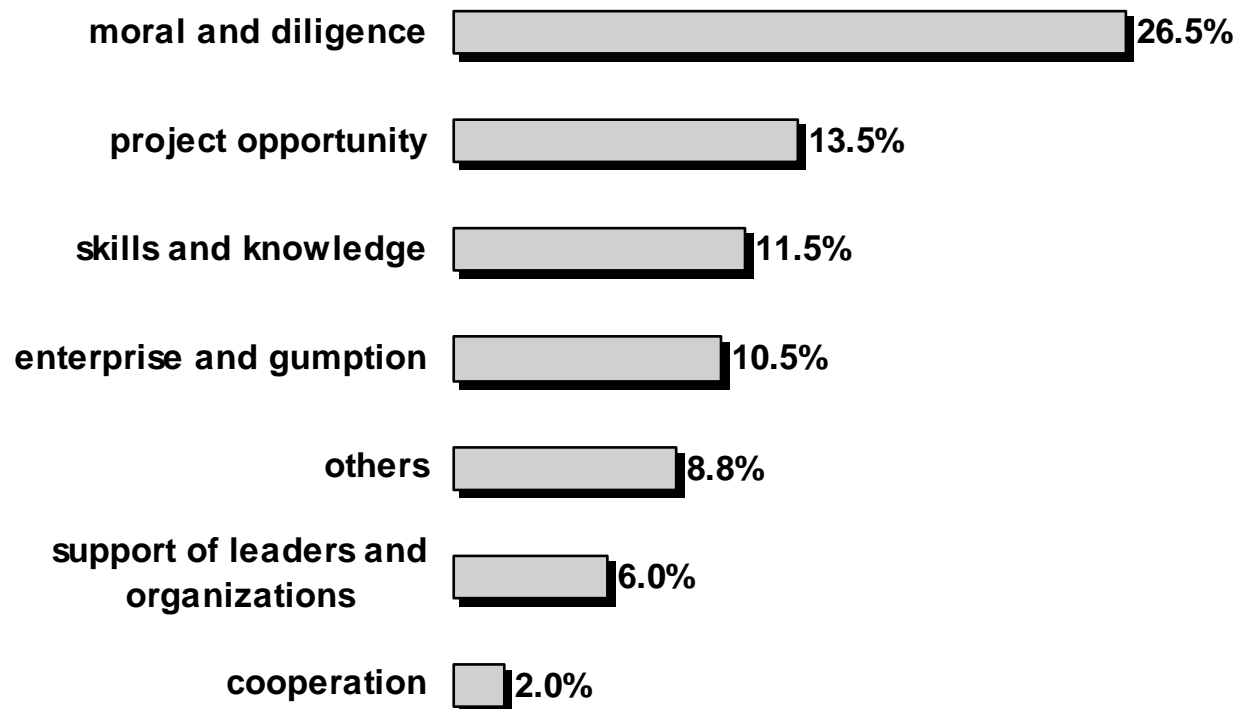
<b>Social moral and professional moral</b>	<b>4.47</b>	<b>Human relations</b>	<b>3.77</b>
<b>Ability for lifetime study</b>	<b>4.44</b>	<b>Ability of written communication</b>	<b>3.77</b>
<b>Solid professional knowledge basic</b>	<b>4.37</b>	<b>Ability of oral communication</b>	<b>3.77</b>
<b>Professional techniques and skills</b>	<b>4.23</b>	<b>Guidance and help from high level experts</b>	<b>3.73</b>
<b>Ability of solving R&amp;D problems of engineering</b>	<b>4.12</b>	<b>Capacity of using modern facility and software</b>	<b>3.70</b>
<b>Capacity of cooperation</b>	<b>4.08</b>	<b>Leadership</b>	<b>3.67</b>
<b>Capacity of datum analyzing and explaining</b>	<b>4.02</b>	<b>Ability of systems and procedure design</b>	<b>3.61</b>
<b>Projects undertaking</b>	<b>3.88</b>	<b>Foreign language skill</b>	<b>3.35</b>
<b>Capacity of formulating trial scheme</b>	<b>3.85</b>	<b>Understanding the impacts of engineering on society and zoology</b>	<b>3.21</b>
<b>Broad knowledgescope</b>	<b>3.85</b>	<b>Membership of professional association</b>	<b>2.69</b>

Note: There are 5 grades for importance scale, '1' means not important at all, '5' means most important.

# Outcome 1—— Core Competencies for E&T

- Key programs of state offered important opportunities for E&T.

Chart : The Attitude of E&T on the Following Factors Impacted on Success



NOTE : Opening questions were used in the investigation. The E&T were asked to write down 'what are the most important factors impacting on success' . The figures in this chart means the percentage of each factor.

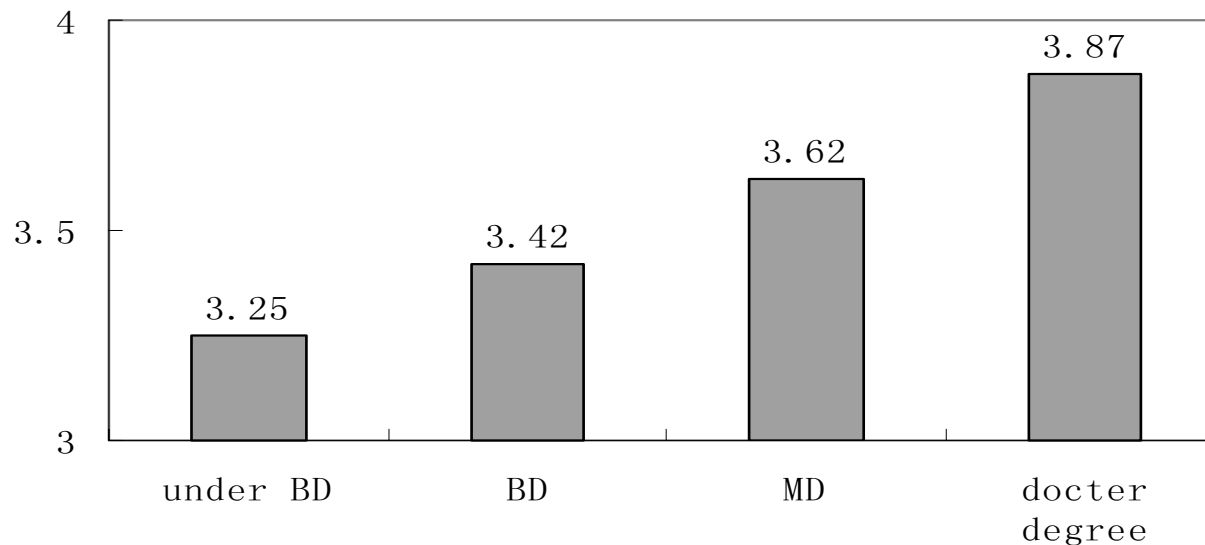
## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

A majority of E&T are cultivated in the top 5 universities or institutes of each fields.

	Universities
Aeronautics and Astronautics	Harbin Institute of Technology
	Beijing University of aeronautics and astronautics
	Pecking University
	Harbin Military Engineering College
	Northwest Industry Universities
Petroleum and Chemical Engineering	China University of Petroleum
	Chinese Academy of Sciences
	Beijing University of Chemical Technology
	Academy of Petroleum Chemical Engineering
	Zhejiang University

## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- Teachers in university had important impact on outstanding E&T, the average scale was 3.65, more important than impacts of parents and teachers in elementary school and middle school;
- The higher education level the S&T have, the more impact teachers in university have on the S&T.

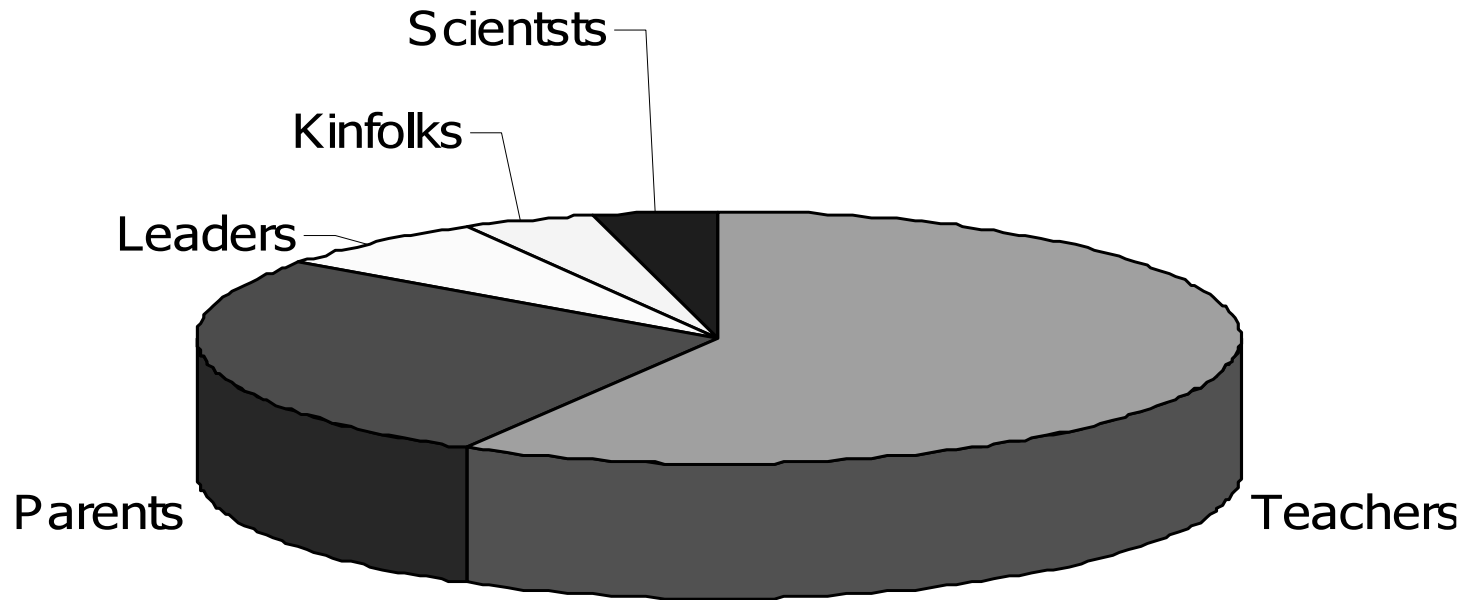


Note: There are 5 grades for importance scale, '1' means not important at all, '5' means most important.

## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- The impact of teachers in universities is NO.1

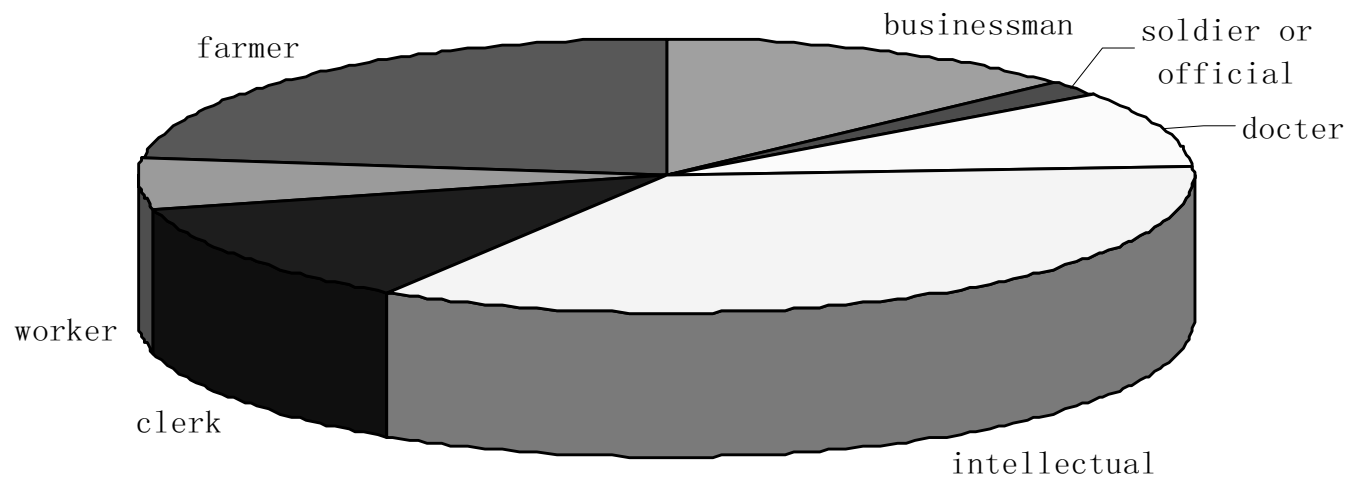
**The Person Influencing the Development of E&T**



## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- The occupation of parents also had some impacts on E&T.

**Occupational Distribution of Members' Father**



## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- The experiences of overseas study had positive impacts on E&T.

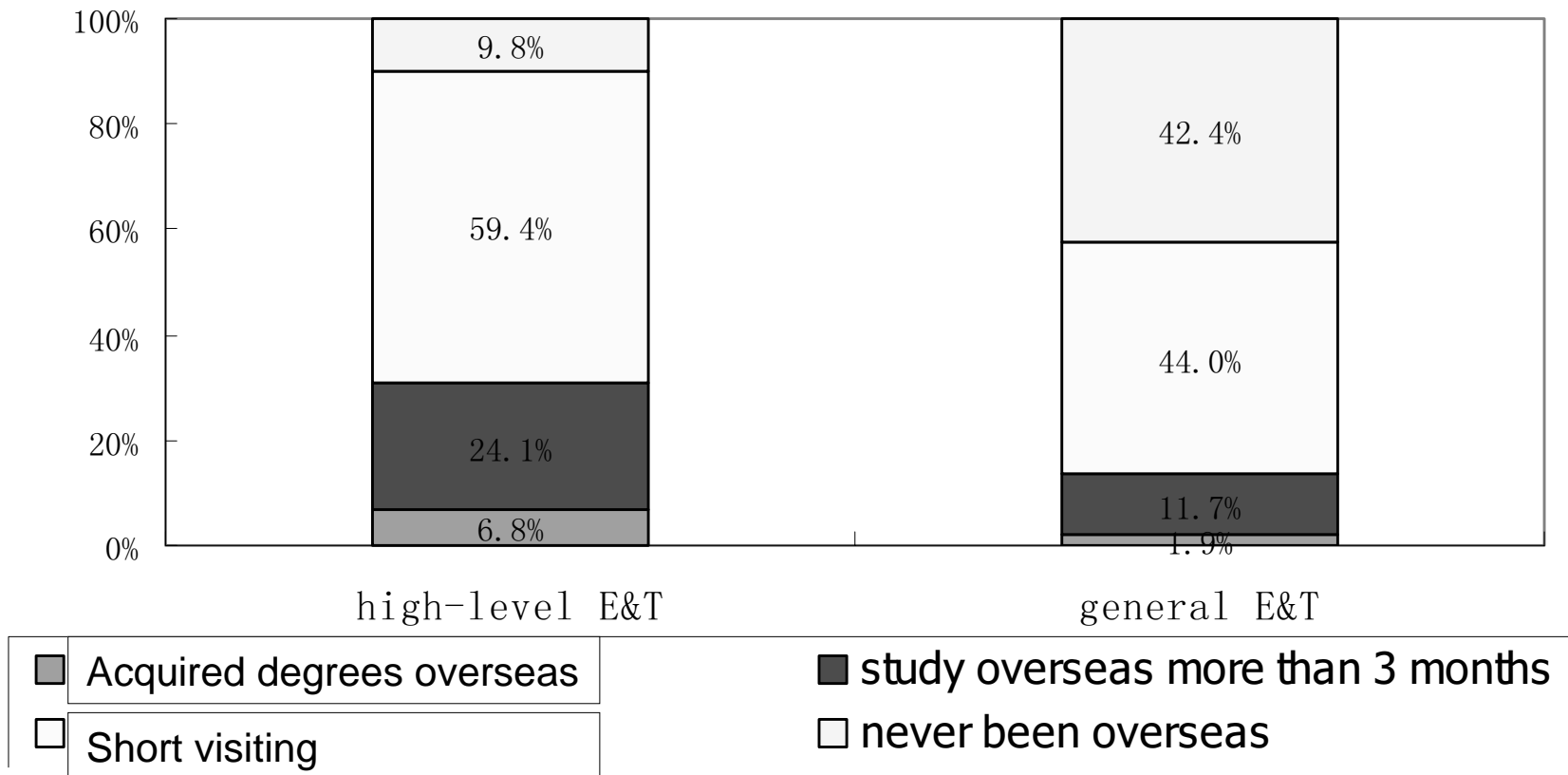
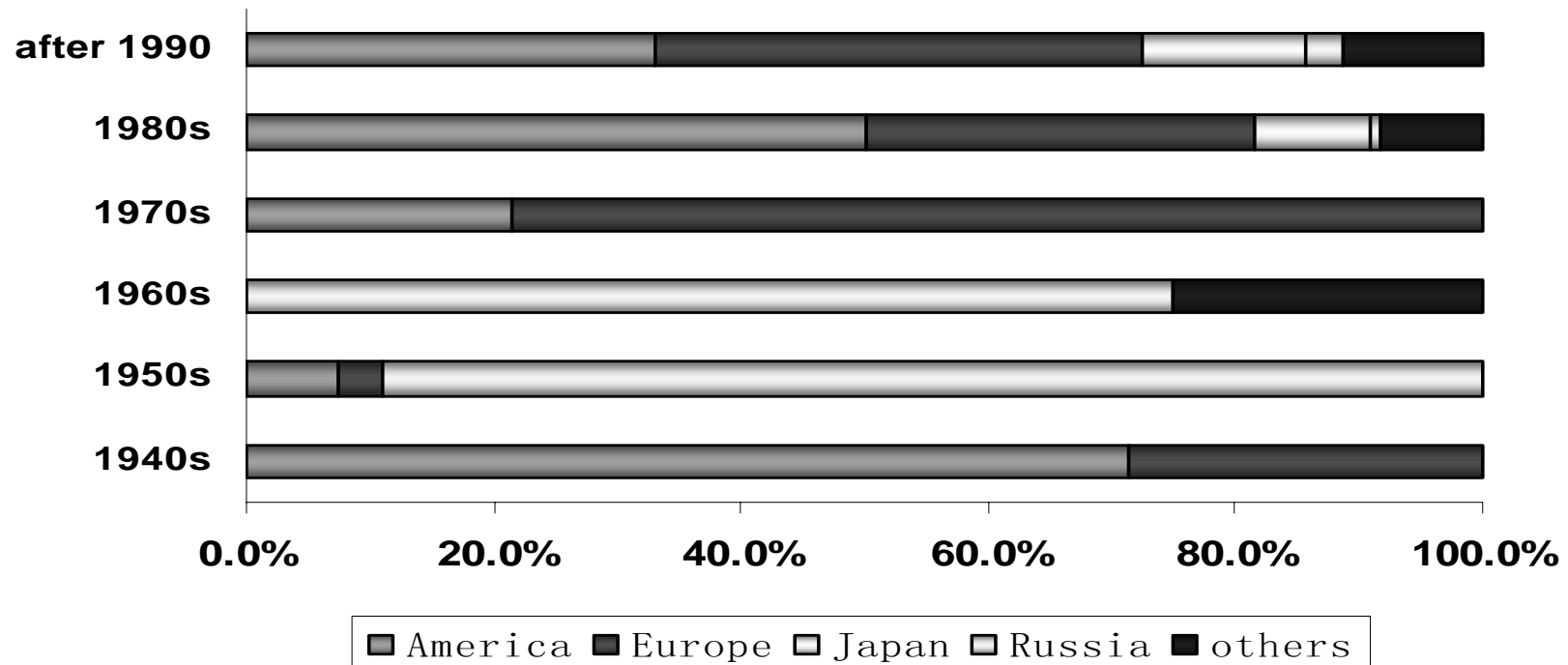


Chart: Oversea Study Experiences for E&T

## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- Before 1949, E&T studied abroad mainly studied in America.
- In 1950s and 1960s, mainly in Soviet Union.
- After China adopted reform and opening-up policy, the number of E&T studied in Europe and America began to increase again, especially in Europe.



## Outcome 2—— The Impact of Sociological Factors on Outstanding E&T

- E&T distributed unequally in different provinces of China.

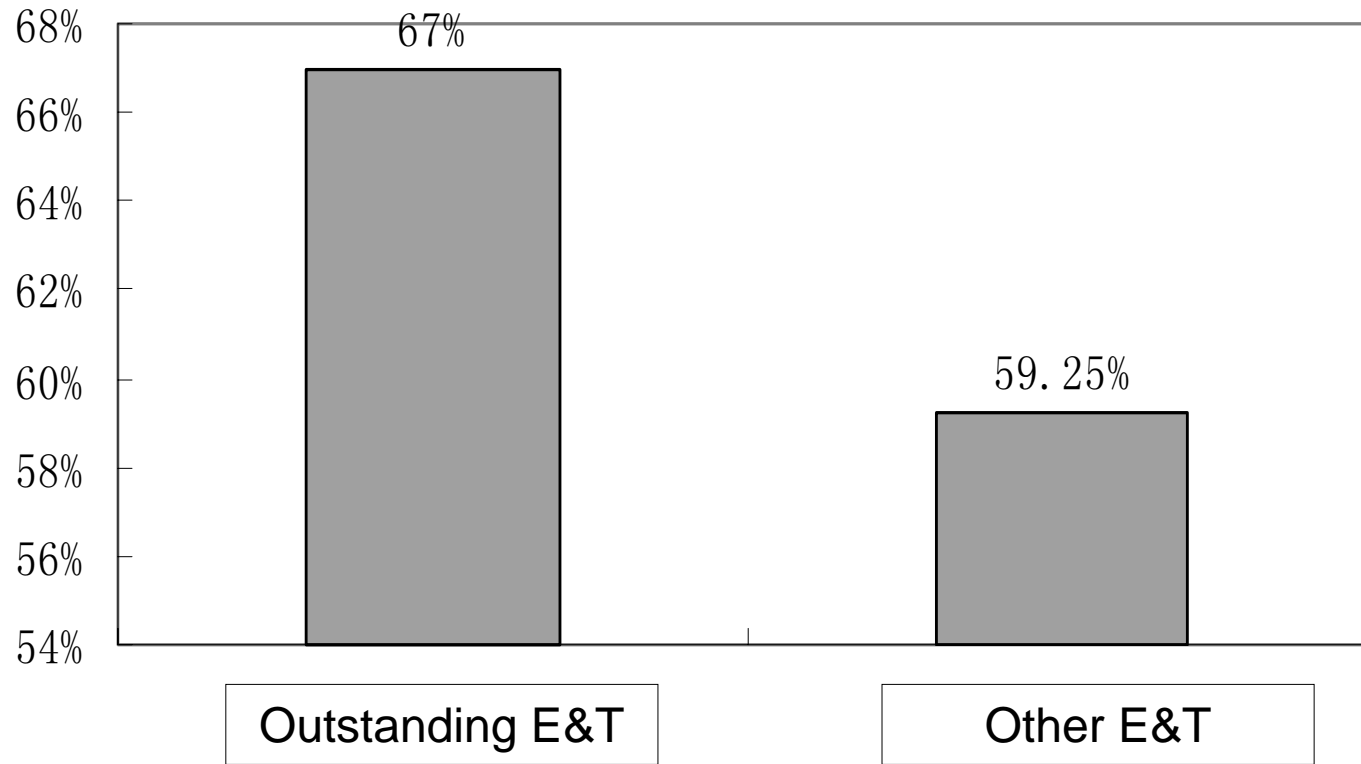
Table: The Native Place of Outstanding E&T and Members in CAE(2001)

Province	Outstanding	Member	Province	Outstanding	Member	Province	Outstanding	Member
JiangSu	129	105	SiChuan	32	26	GanSu	11	1
ShanDong	110	37	HeNan	31	16	NeiMengG	10	2
ZheJiang	90	105	AnHui	31	20	GuangXi	7	3
HeBei	88	25	GuangDong	28	38	ChongQing	5	7
LiaoNing	80	27	JiangXi	27	6	YunNan	3	4
HuBei	69	30	JiLin	22	7	GuiZhou	3	2
ShangHai	54	38	HeiLongJ	22	6	HaiNan	2	2
HuNan	50	34	ShanXi(1)	19	11	XinJiang	1	1
BeiJing	42	15	TianJin	18	11			
FuJian	35	29	ShanXi(3)	17	5			

Note: The total number of members in Chinese Academy of Engineering was 612 until 2001.

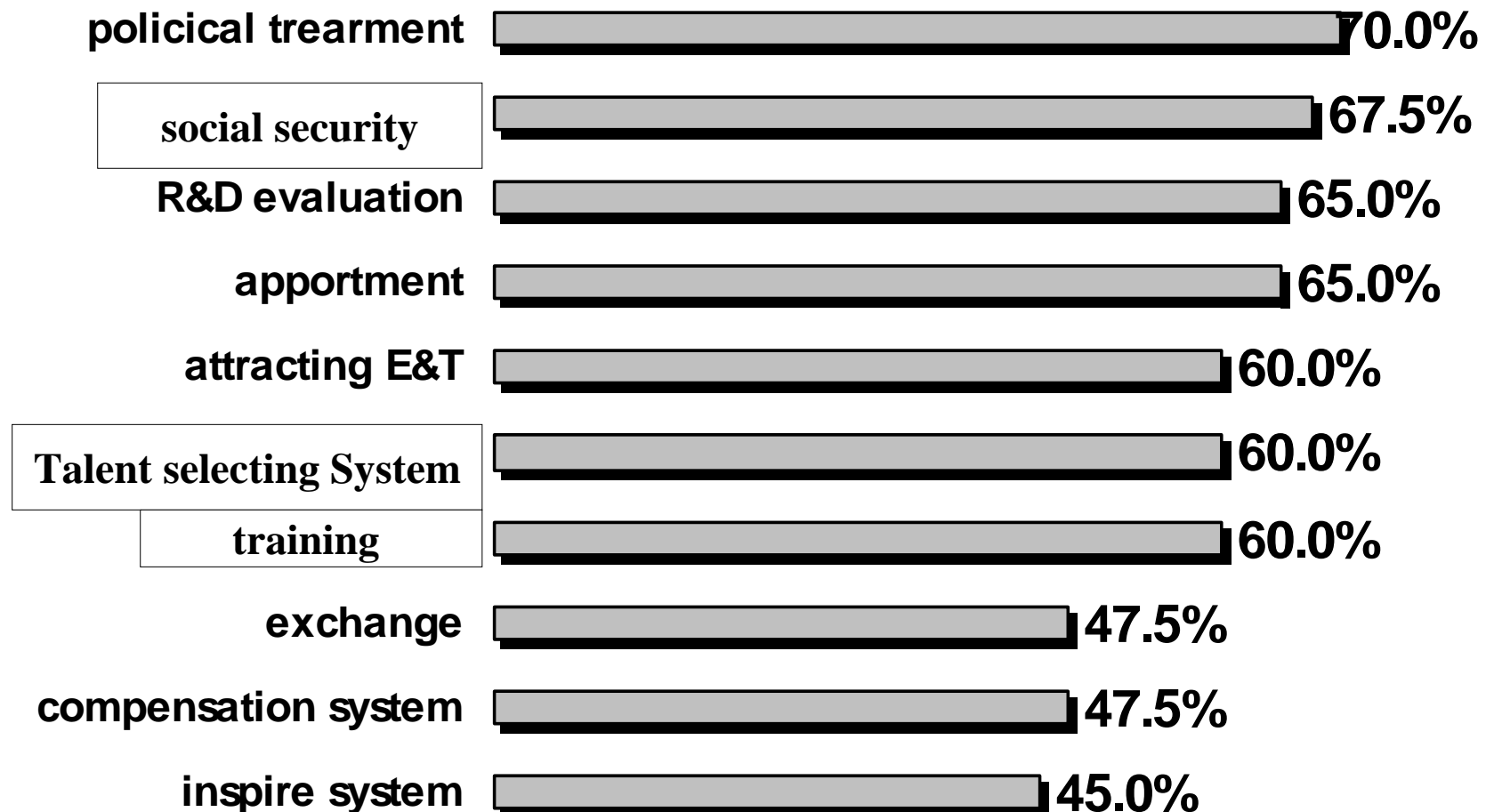
## Outcome 3—— Attitude Survey

The job satisfactory degree of outstanding E&T was 67% while that of general E&T was 59.25%.



## Outcome 3—— Attitude Survey

The Satisfactory Degree of E&T with Organizational Management Policies



## Outcome 5 — Attitude Survey

### Education and Training

E&T had a low satisfaction with the education and training system of our country. 21.8% of them thought what the students learnt didn't meet the practical need of their work.

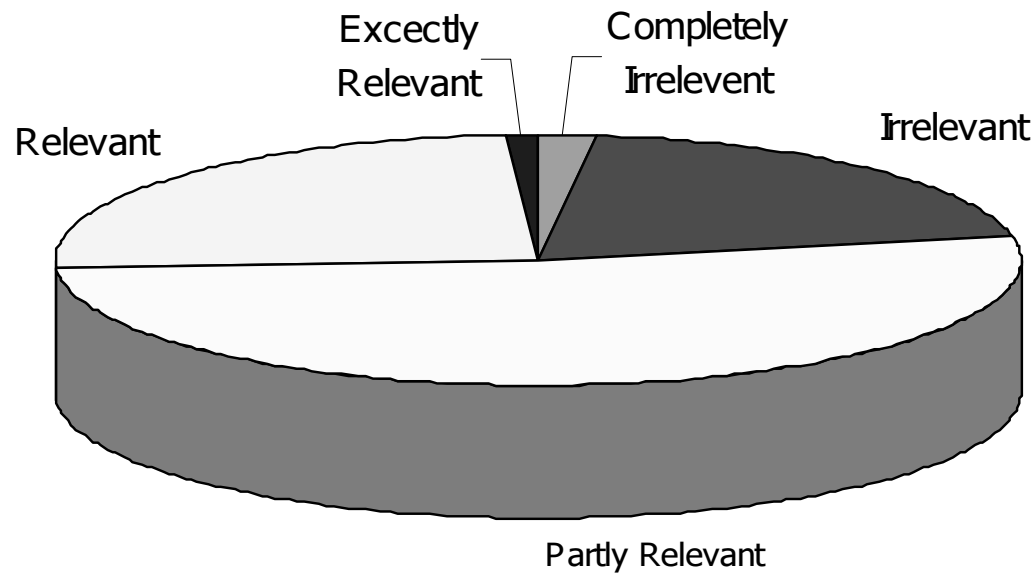
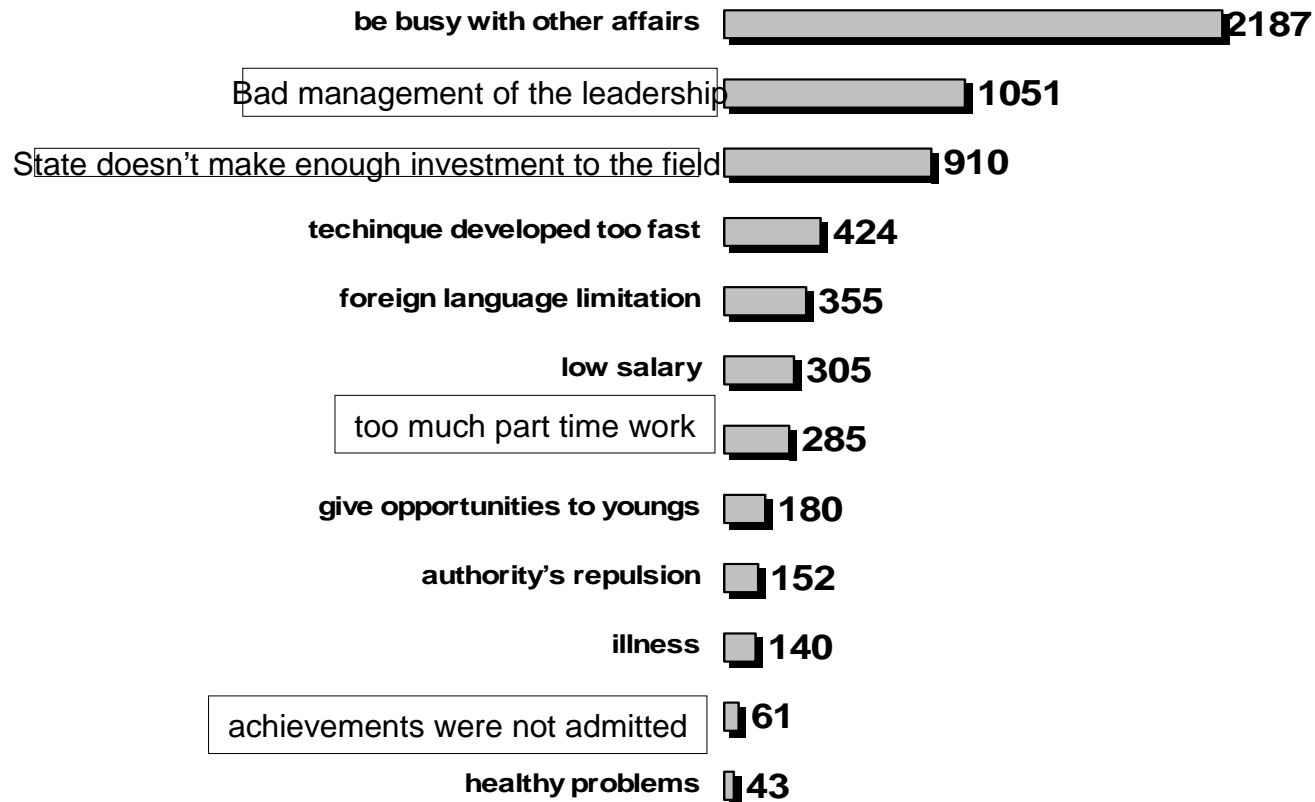


Chart: Views on Whether the Graduates Can Fit Practical Work

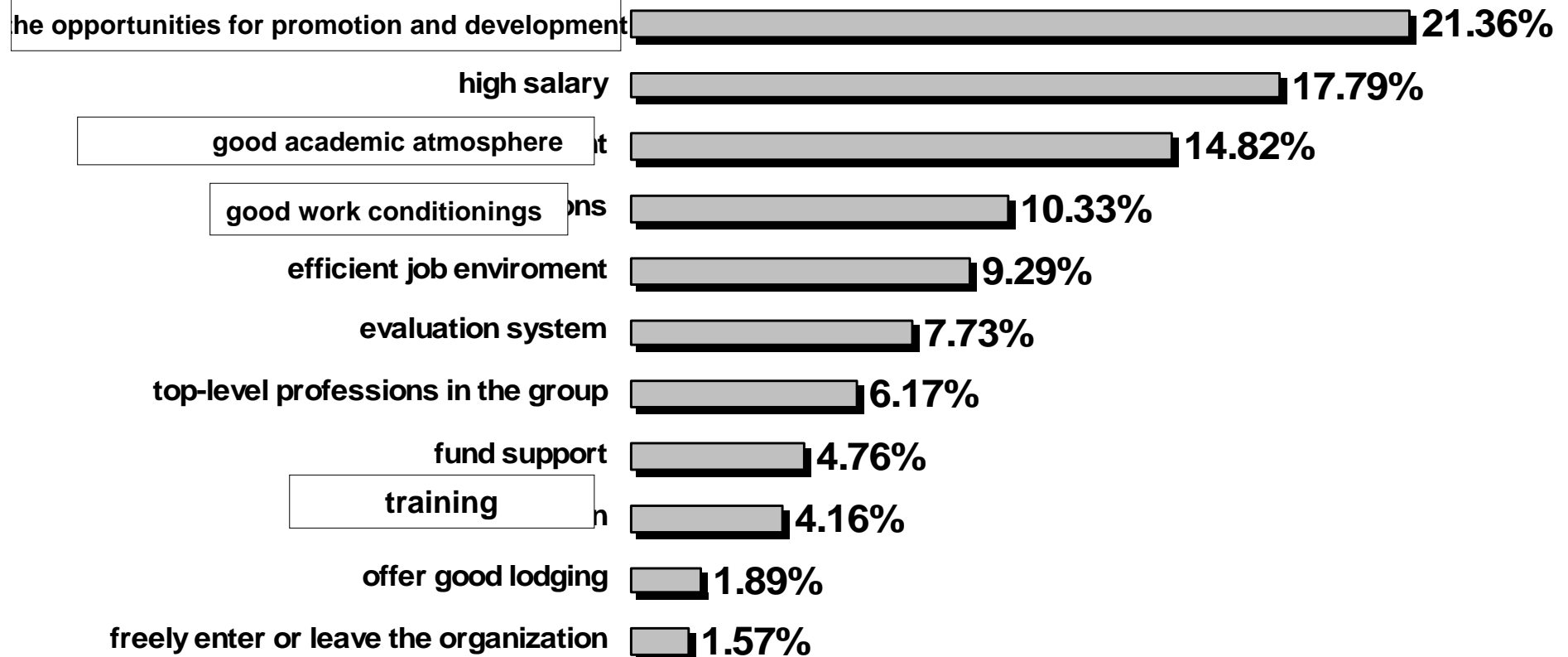
# Outcome 3 — Attitude Survey

## Factors Embarrassed E&T for Better Development



## Outcome 3 — Attitude Survey

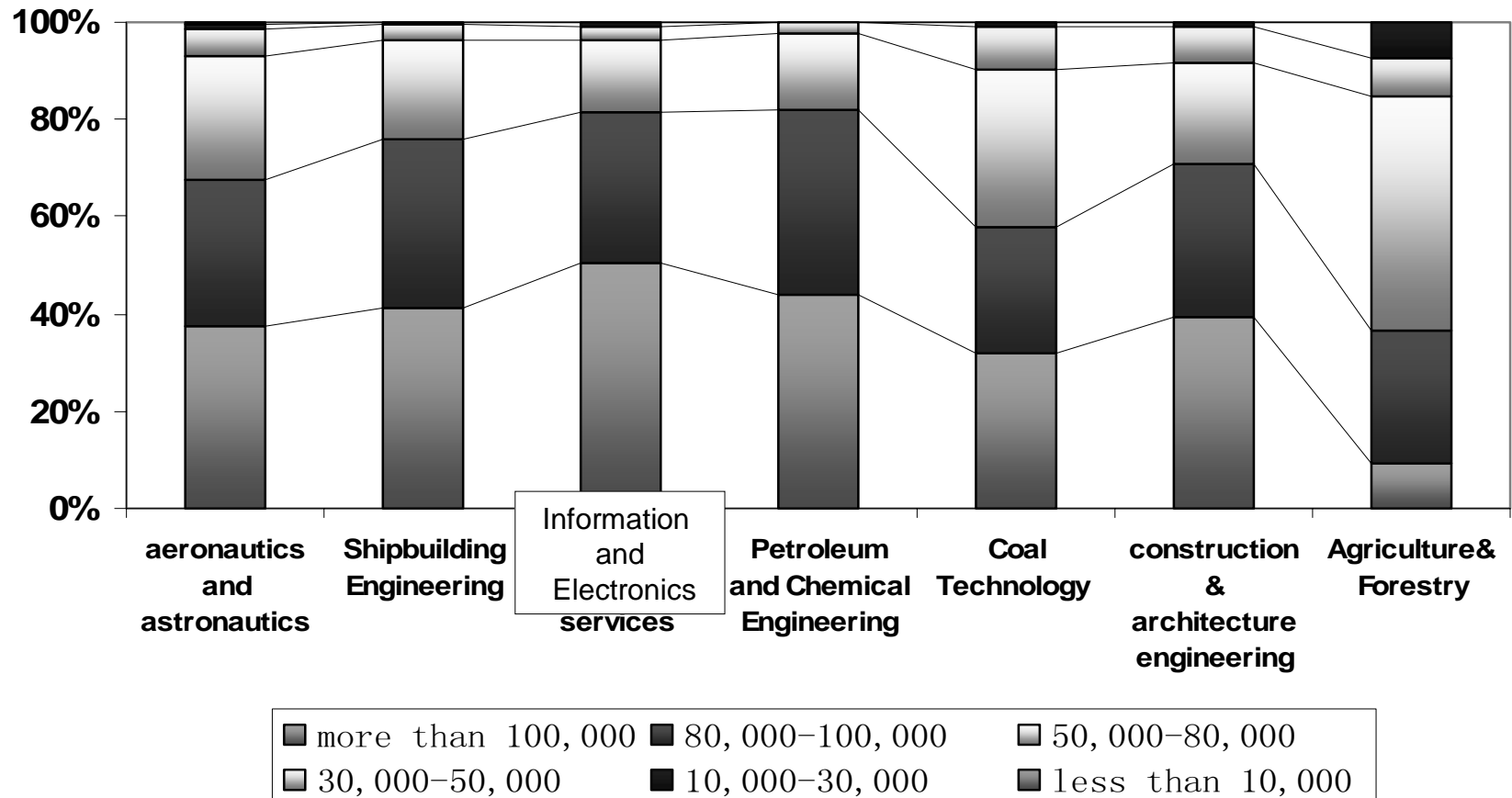
### Most Important Factors in Attracting Excellent E&T



# Outcome 5 Views on Some Macro-policies

## — the Ideal Yearly Compensation of E&T

E&T in Information & Electronics had a higher expectation on year compensation while E&T in agriculture & forestry had a lower expectation



## Remarks

- ‘Be busy with other affairs’ became No. 1 as one of obstacles for further development
- ‘Ceiling effect’
- Education of Engineering & Technicians
- Hard indicators versus soft indicators?

**Thanks!**