



**MINISTRY OF RESEARCH AND TECHNOLOGY**

***Implication of the International Mobility of  
Human Resource in Science and  
Technology on the Innovation  
Development of the Country and the  
Region***

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# INTRODUCTION

1. Globalisation
2. Economic development on the region
3. The large disparities in the world distribution of resources of science and technology.
4. 4<sup>th</sup> APEC Science Ministers' Meeting has been appointed to develop International S&T networks, include the International mobility of researcher.



## INDONESIAN POSITION IN GLOBAL (1) *technology achievement index*

Country	Ranking
Singapura	12
Malaysia	20
Filipina	56
Cina	65
Thailand	39
India	64
Vietnam	73
<b>Indonesia</b>	<b>78</b>

Ref.: World Economics Forum 2003



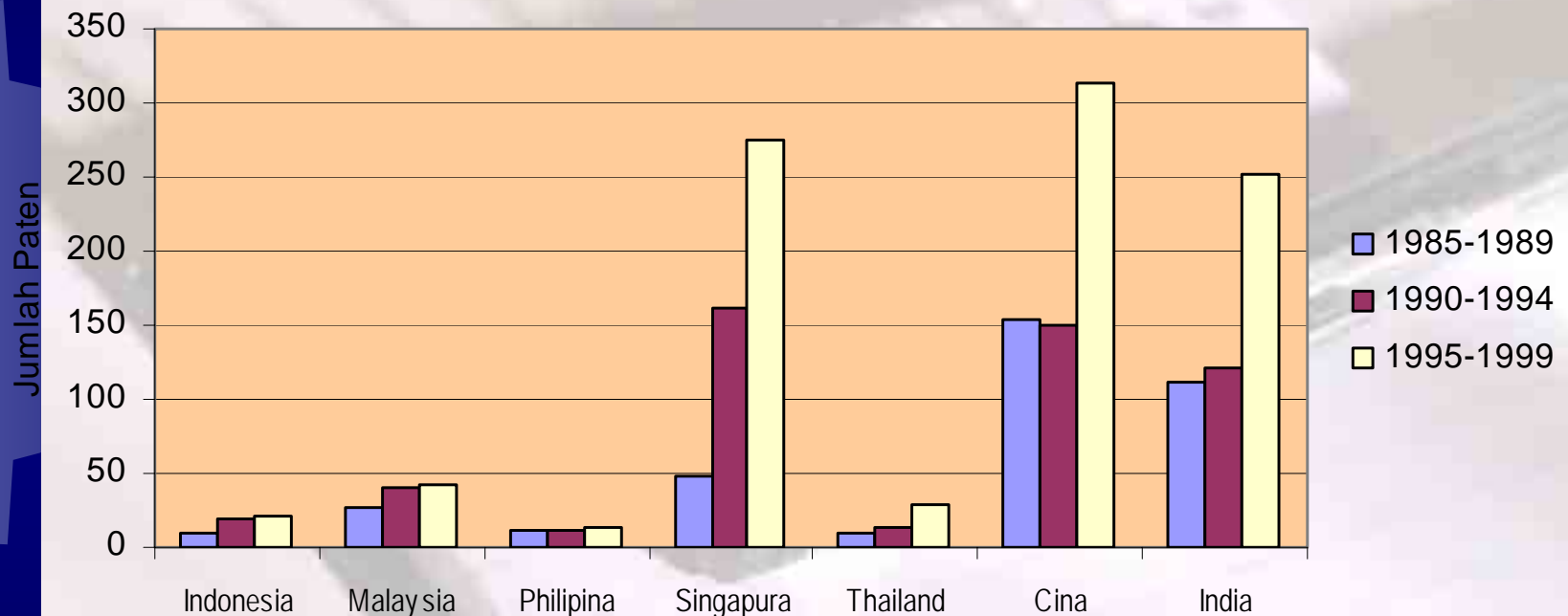


## INDONESIAN POSITION IN GLOBAL (2) *(growth competitiveness index)*

Country	Rank	
	2002	2003
Singapura	7	6
Malaysia	30	29
Thailand	37	32
Cina	44	38
India	56	54
Filipina	66	63
Vietnam	62	60
Indonesia	69	72



## INDONESIAN POSITION IN GLOBAL (3) Patent Applications in ASIA

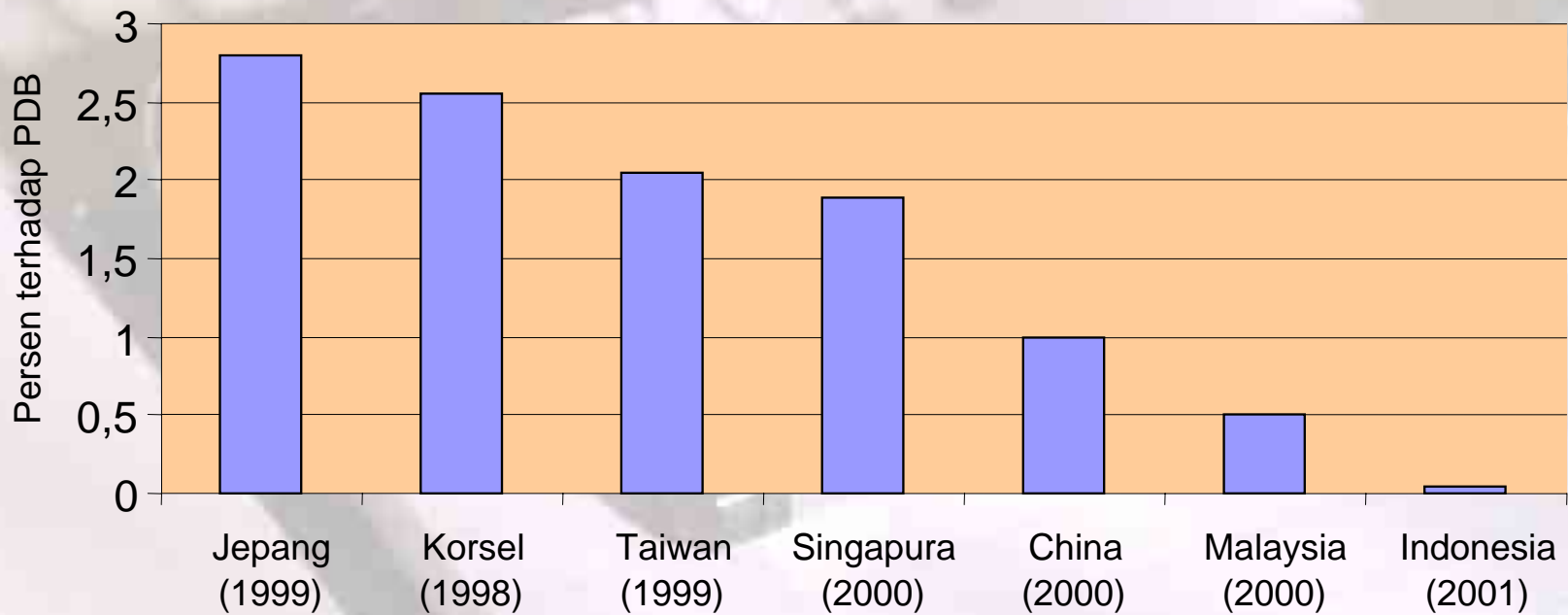


Ref:Periskop Report, Work Package 3, Strengthening Science, Research and Technology Performance and International Benchmarking based on R & D Indicators, KMNRT, Fraunhofer Gesellschaft, BmBF, April 24, 2002



## INDONESIAN POSITION IN GLOBAL (2)

### R&D Budget by GNP

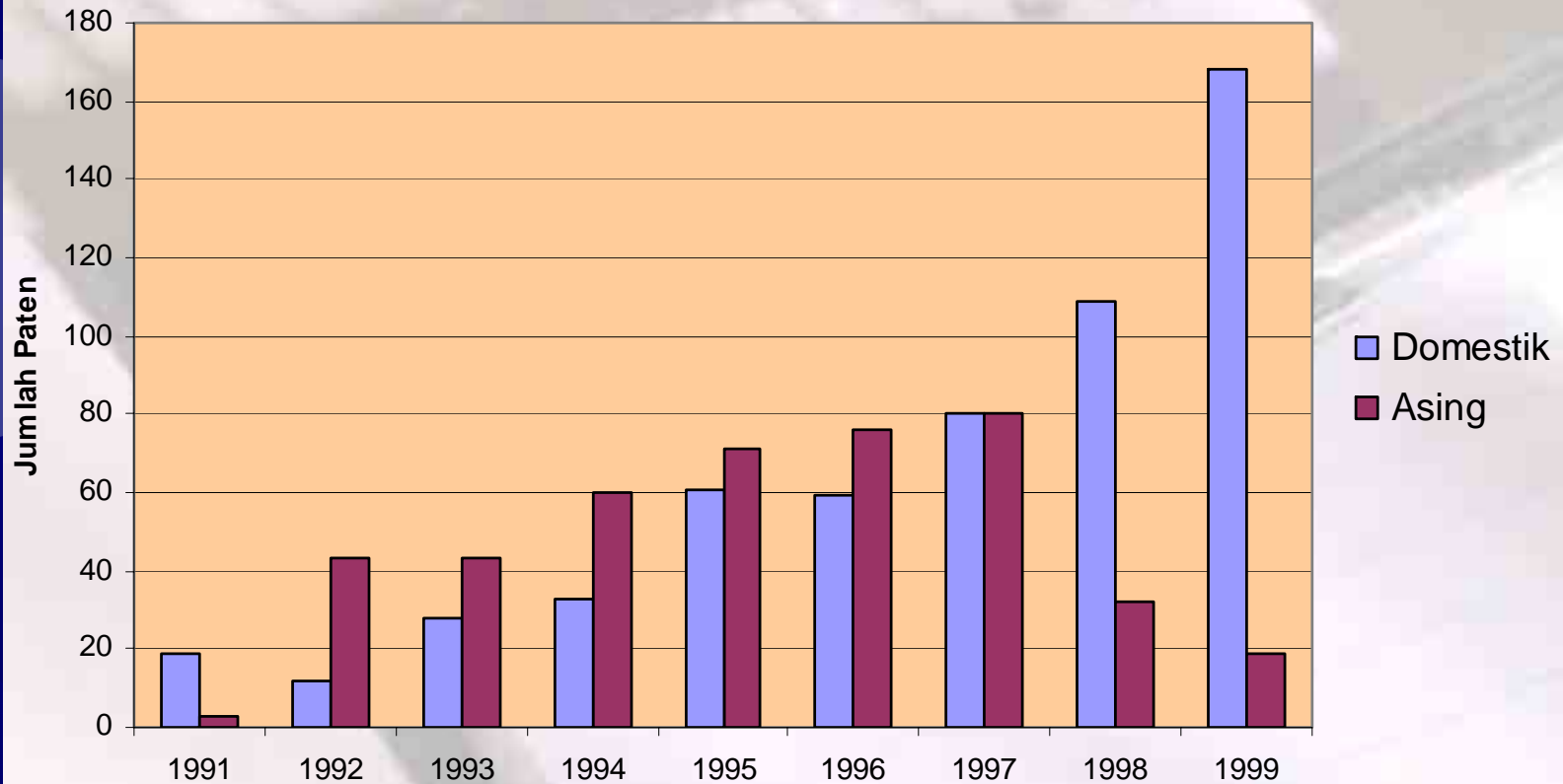


Ref.:Data Indikator Iptek Nasional, LIPI 2003



# NATIONAL S&T CAPACITY (1)

## PATENT APPLICATION IN INDONESIA 1991-1999

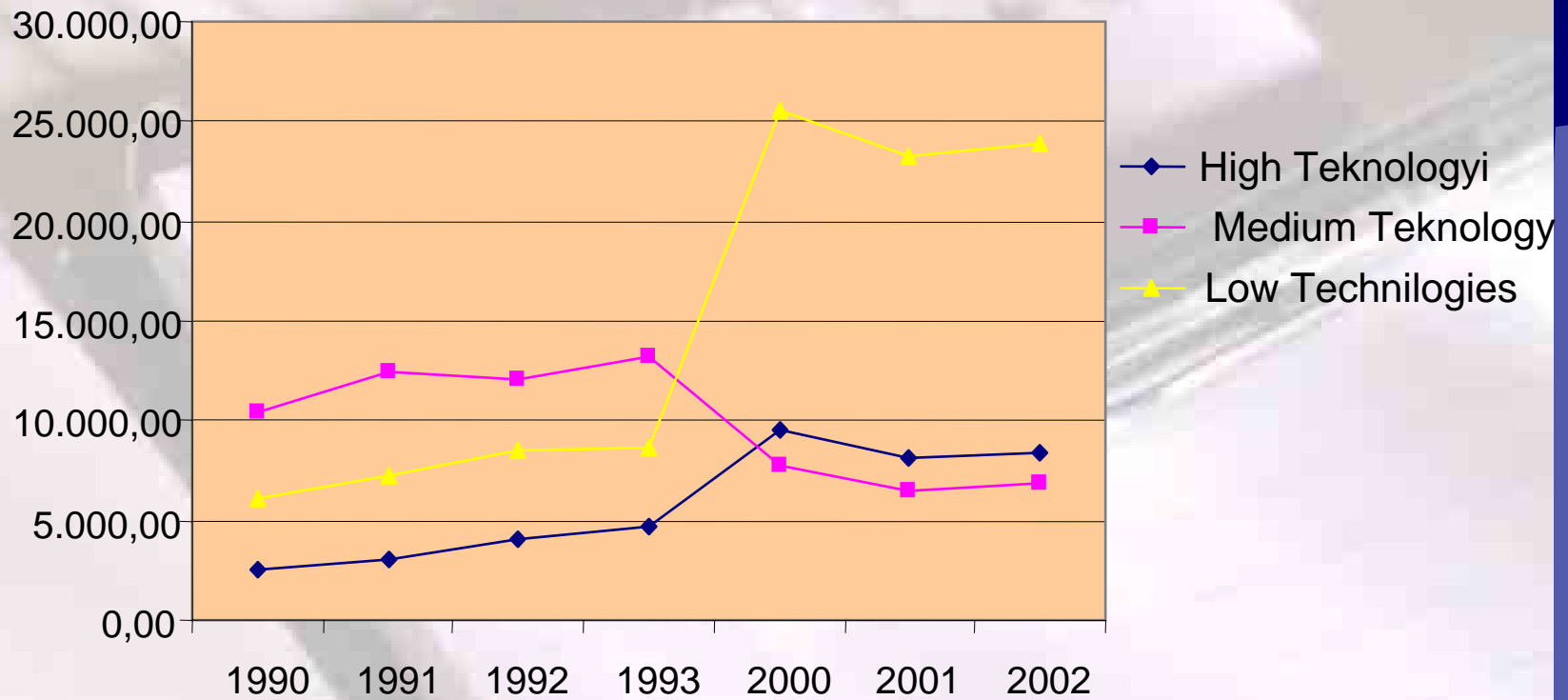


Ref.: Periskop Report, Work Package 3, Strengthening Science, Research and Technology Performance and International Benchmarking based on R & D Indicators, KMNRT, Fraunhofer Gesellschaft, BmBF, April 24, 2002.



## NATIONAL S&T CAPACITY (2)

Manufacturing Product Export Growth (in Million US\$)



Ref.:Data Indikator Iptek Nasional, LIPI 2003





## KEY FINDINGS OF RECENT STUDY

- ★ **A Recent Study of ASEAN-ROK, conducted study on Development of Technology Competitiveness Indicators in ASEAN (Bali - July 28<sup>th</sup>, 2004)**
- ★ **The Study is based on 34 Indicators of survey on hard data and soft data (opinion)**
- ★ **The Indicators is grouped into five topics:**
  - R&D Expenditure (Financial Input)
  - R&D Personnel (People Input)
  - Intellectual Asset Formation (Performance Output)
  - Technology and Educational Infrastructure (Environment)
  - Technology Management (Process)



# KEY FINDINGS OF RECENT STUDY

	R&D Expenditure (Financial Input)	R&D Personnel (People Input)	Intellectual Asset Formation (Performance Input)	Technology and Educational Infrastructure (Environment)	Technology Management (Process)	Science & Technology Competitiveness Indicator	
BRUNEI	11	12	12	5	6	7	BRUNEI
VIETNAM	8	5	9	11	9	9	VIETNAM
LAO P.D.R	12	11	3	9	10	10	LAO P.D.R
CAMBODIA	10	10	11	10	4	6	CAMBODIA
INDONESIA	7	3	5	12	12	11	INDONESIA
MALAYSIA	5	8	8	4	2	5	MALAYSIA
PHILIPPINES	9	9	10	8	11	12	PHILIPPINES
SINGAPORE	4	6	6	2	1	3	SINGAPORE
THAILAND	6	7	7	6	8	8	THAILAND
KOREA	3	4	2	3	7	2	KOREA
CHINA	2	2	4	7	5	4	CHINA
JAPAN	1	1	1	1	3	1	JAPAN



# KEY FINDINGS OF RECENT STUDY

The Study Shows Indonesia is weak on :

## R&D Expenditure (Financial Input) Rank 7

- Total Expenditure on R&D (US\$ millions)
- Total Expenditure on R&D (% of GDP)
- Business Expenditure on R&D (US\$ millions)
- Funding for Technological Development (survey)

## R&D Expenditure (Financial Input) Rank 11 among others include

- Investment in Telecommunication (% of GDP)
- Telephone Lines (number of main lines per 1,000 inhabitants)
- Mobile Telephone Subscribers (number of subscribers per 1,000 inhabitants)
- Computer in Use; Computer Power (number of computers per 1,000 people)
- Internet Users (number of internet users per 1,000 people)
- Total Public Expenditure on Education (% of GDP)
- The Educational System; University Education (Survey)
- Illiteracy (adult over 15 years )
- Science in Schools (Survey)
- Youth Interests in Science & Technology (Survey)

## Technology Management (Process) Rank 11

- Company – Research & University Cooperation
- Relocation of R&D Facilities
- Technological Cooperation
- Basic Research



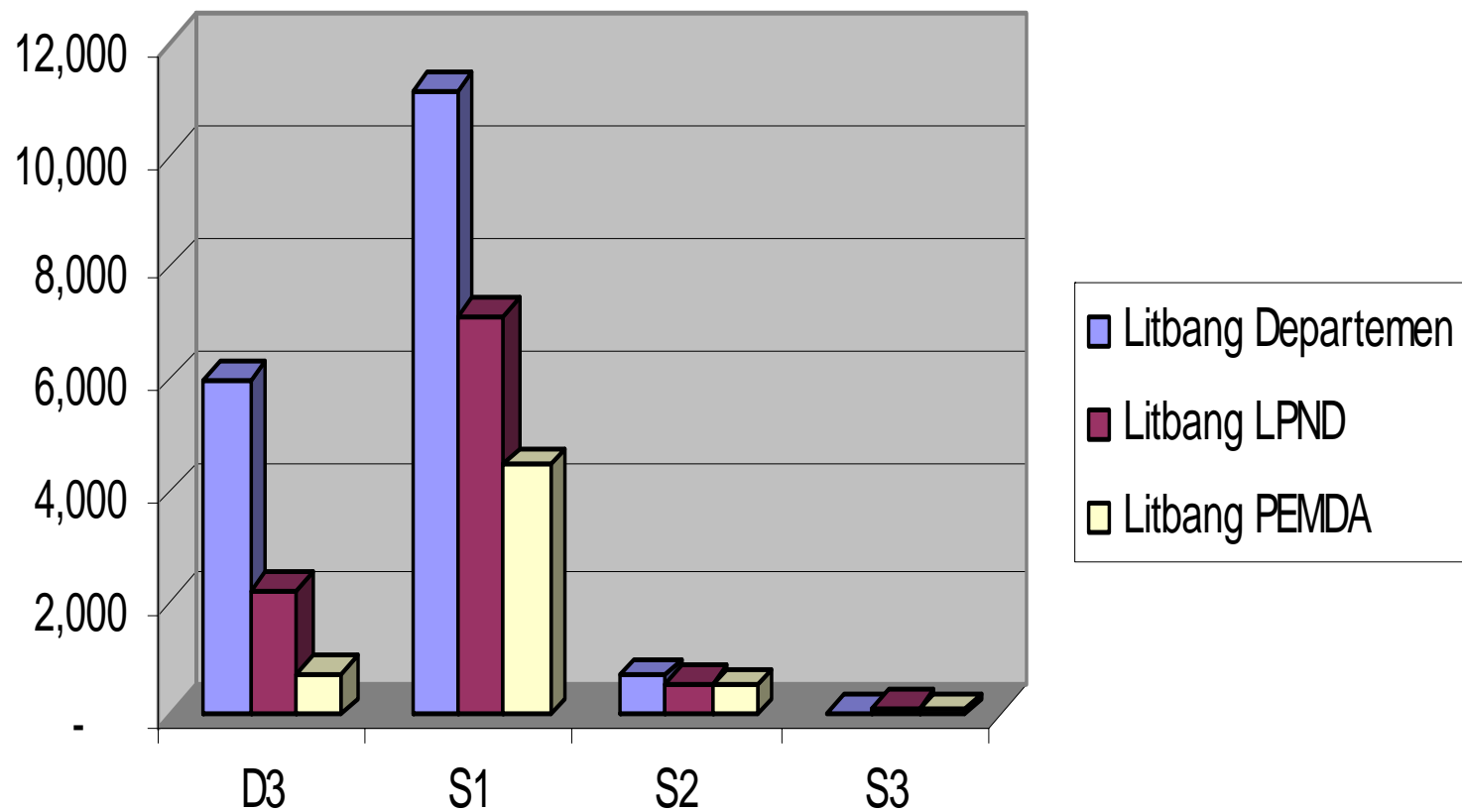
# NATIONAL MACRO ECONOMY INDICATOR

INDICATOR	2001	2002	2003
Inflation (%)	12,55	10,03	5,06
Interest Rate (SBI) monthly (%)	17,6	12,8	8,3
Exchange Rate (Rp/US\$)	10.400	8.940	8.450
Reserve (US\$ miliar)	28,0	32,7	36,2
IHSG Bursa Efek Jakarta	392	425	692
PDB Growth (%)	3,3	3,7	4,1



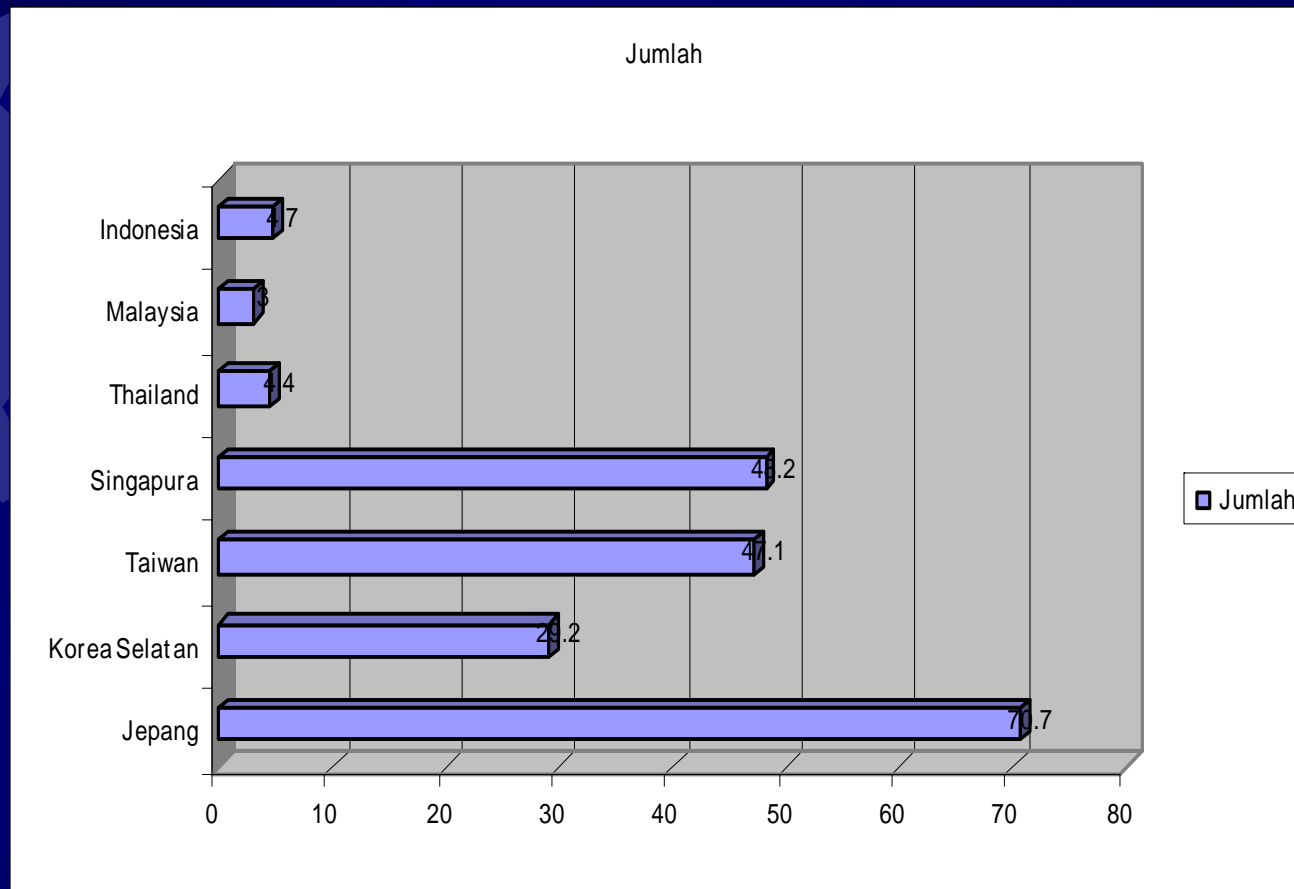


## Total Civil Servants on R&D Unit of Departemen, Non Departemen and Local government by Education Year 2002



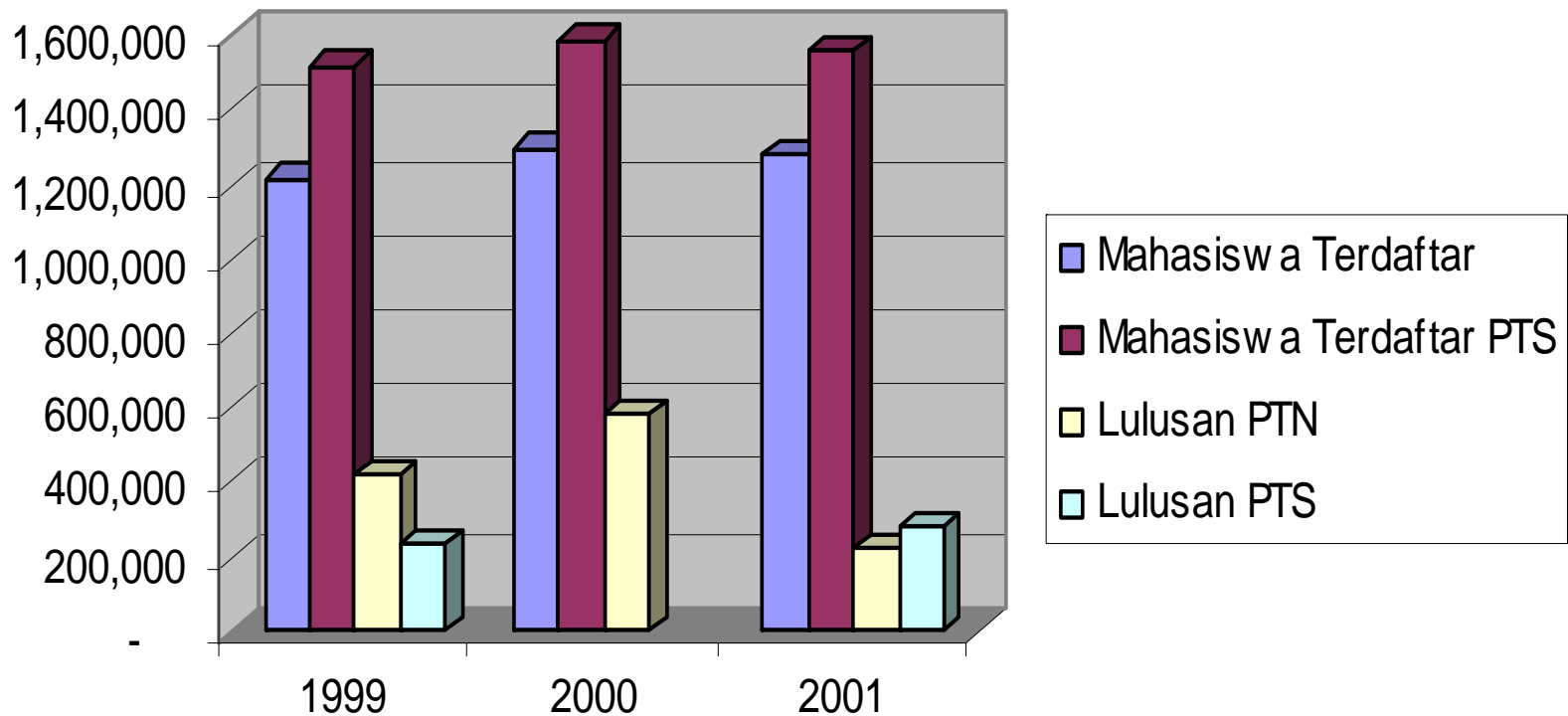


## Total Researcher per 10.000 population on selected Asia countries





## Total Student enrollment and graduate tertiary education 1999 - 2001





# WHY WE HAVE TO BE WORRY

- ✦ Low capacity to carry out activities to develop the economy, Especially from R&D&E&I to Industry
- ✦ Low industrial activities, especially with medium – high added value
- ✦ High imported products
- ✦ Indonesia R&D&E&I capabilities declining due to economic difficulties



**Attract  
HRSC to  
migrate to  
develop  
countries**





## ISSUES TO BE ADDRESSED

### on International Migration of Human Resource on Science and Technology

1. Definition of HRST still debate, but base on “Canberra Manual “ defines as people who fulfill one or the other of the following conditions :
  - They have success fully completed education at the tertiary level in an S&T field of study.
  - They are not formally qualified, but are employed in a S&T occupation where the above qualification are normally required.
2. Lack of data sources.
  - Vital registration
  - Administration sources (immigration arrangement
3. Concept and clasification system of migration vary among countries.
4. International policies co-operation on international migration haven't been develop.
5. Mismatch between education and job opportunity in Indones



## The Impact of International Migration of HRSC

- **In sending countries**
  - Shortage of HRSC
  - Remittances
  - For temporary migration, it can be develop networking, developing new knowledge, tranfer knowledge.
- **In receiving countries**
  - increase stock of HRSC
  - Stimulation of innovation capacity



## Condition of National and Global on Science and Technology Development

### ★ Limited resource

Due to the recent crisis, Indonesia's resource (especially funding) for Science and Technology is still limited. Although the percentage of GDP increases, however in term of value of money is decreasing. With this limitation, **collaborations would be the most strategic approach to combine resources nationally and internationally.**

### ★ International networks

Globalization and International agreements such as APEC, etc. required all country to joint forces in international networks. Access to International community becomes very important. **Building networks and partnership with international community would be a must**

### ★ Trend in International Cooperation

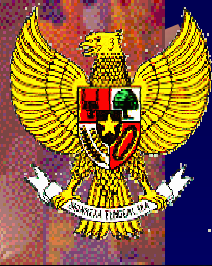
International cooperation (multilateral and bilateral) required all participating country to contribute their resources. **International cooperation is directed toward Cost sharing basis.**





# Objective

- ✦ To stimulate Indonesian research activities in the International communities; (*Leverage*)
- ✦ To expedite national research activities to be more compatible with global development; (*Leverage*)
- ✦ To achieve high quality research, with the aim of presenting the results in reputable International Journals, and / or inventing a new key industrial technology; (*Leverage*)
- ✦ To encourage collaboration on scientific and technological endeavors of mutual interest between Indonesia and foreign countries through exchange of ideas, information, skills, and utilization of science and application of technology; (*Collaboration*)
- ✦ To optimize the utilization of existing research facilities



# RECOMENDATION



## NATIONAL LEVEL

- Human Capacity Building (training, education )
- Development policy on HRSC (Link and match between education and job creation).
- Strengthening S&T Board on local government (Province and Regency)
- Development, Utilization and mastery of Science and Technology
- Strengthening and improvement of national S&T programs
- Establish data base of HRSC.
- Re-define migration policy ,especially for HRSC.

## INTERNATIONAL LEVEL

- Resource sharing (Facility, Equipment, etc.)
- Develop joint research for providing data on International Migration of HRSC in ASPAC Region.
- Develop International Migration Policy of HRSC (BILATERAL AND MULTIRATERAL AGREEMENT).
- Strengthening and maintaining HRSC for increasing economic growth in the ASPAC region.
- Create data base of HRSC in the ASPAC region.



## ☀ References

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# Thank You

