

# India's Reverse Brain Gain in Liberalized Era

**Initiated and Sponsored by :** National Sciences and Technology Management Information System  
**Ministry of Science & Technology Govt. of India, New Delhi**

**Study conducted by :** NATURAL RESOURCES INDIA FOUNDATION (NRIF), NEW DELHI-110087

July 2009

## Preamble

- Brain gain has been instrumental in addressing the skilled manpower demand in many industrialized economies. This has on the other hand led to the shortage of skilled manpower in native countries. Reverse-brain-gain (RBG) is thus assumed importance in this context.
- The liberalization of economy and changing industrial climate in India created opportunities for trained / skilled personnel to come to India and has provided employment opportunities in the high-technology hub and to science-based industries like: biotechnology, pharmaceuticals, nano-technology, bio-informatics, information and communication technology, e-banking, etc.
- With this backdrop the Union Ministry of Science & Technology, (National Science & Technology Management Information System-NSTMIS), Govt. of India, assigned to NRIF the Study entitled: "**India's Reverse Brain Gain in Liberalized Era**", in early 2007.
- Therefore, NSTMIS (DST), MoS&T, Govt. of India attaches a great importance to this study, as it may provide an assessment of the trends in brain gain and the contribution made by the returnee respondents after coming back (from the 7 continents) to India.
- The findings of the study were presented and discussed at the Programme Advisory Committee (PAC), appointed by the DST, Gol on 23rd September 2008.
- The Department thanks the project advisory committee (LPAC) for their guidance and suggestions and Principal Investigator and his team in the conduct and completion of this study.

July 2009

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## Objectives

- To study major technological areas where reverse brain drain leading to gain appears to have occurred:
  - Biotechnology
  - Drugs & Pharmaceuticals
  - Agriculture
  - Information and Communication Technology (ICT), etc.
- To find the extent, spread and impact of Reverse Brain Gain (RBG) in the above areas.
- To underline the factors that govern RBG in various areas, and
- To provide suggestions and recommendations including interventions for policy.

## Definition of RBD/RBG

- Brain Drain** is defined as migration of highly qualified persons from the native country to other countries-- a phenomenon known as '**Brain Drain**'.
- The homecoming of highly qualified and skilled people is termed as "Reverse Brain Drain" (RBD) or "Reverse Brain Gain" (RBG).**

## Reference Period of the Study

- 1990-91 to 2006-07 (17 years).
- Pre-WTO: 1990-95;
  - WTO & Post: 1996-2004;
  - Beyond 2005.

## Project Duration

May 2007 to November 2008

## Principal Investigator

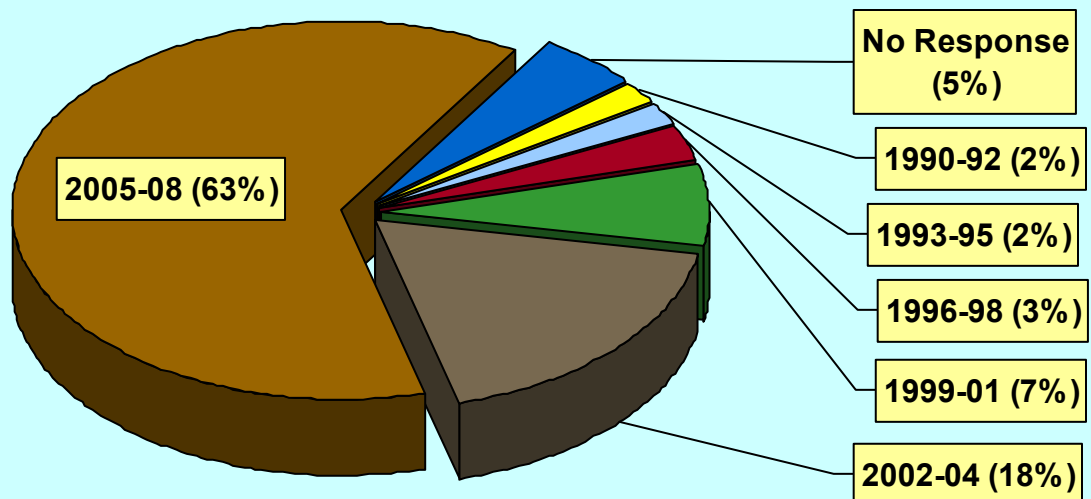
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## Methodology & Approach

- **A four-pronged approach** was adopted for the study, viz. a) Desk research, b) Contacting institutes and industry, c) Contacting professionals, d) Direct interaction approach with eminent scientists, academicians, researchers / scientists in government laboratories, etc.

## KEY FINDINGS

### Triennial-wise return of RBD/RBG Persons



### Technological Areas of RBD/ RBG Persons

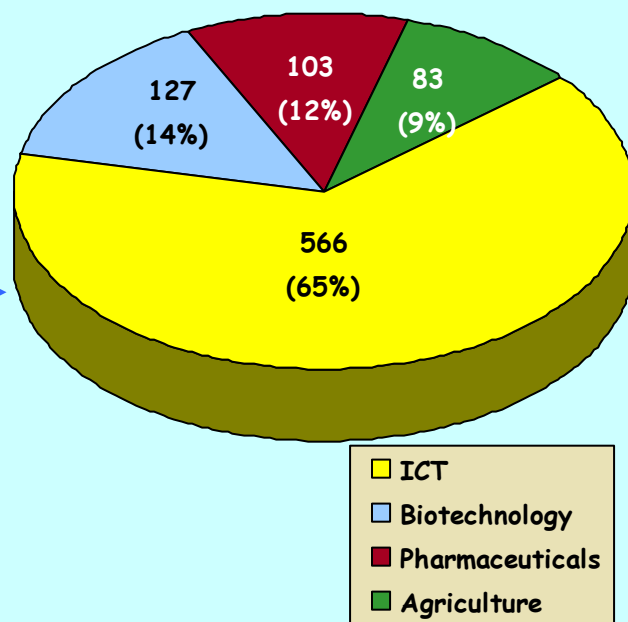
- Brain drain leading to gain has occurred in four envisaged technological areas:
  - Information and Communication Technology (ICT)
  - Biotechnology
  - Pharmaceuticals
  - Agriculture

### Sample coverage (Technological Areas)

( See Pie-chart on right )

- ICT (65% of Sample respondents=879);
- Biotechnology (14% of sample);
- Pharmaceuticals (12% of sample);
- Agriculture (9% of sample);

### RBD / RBG Returnees in Technological Areas

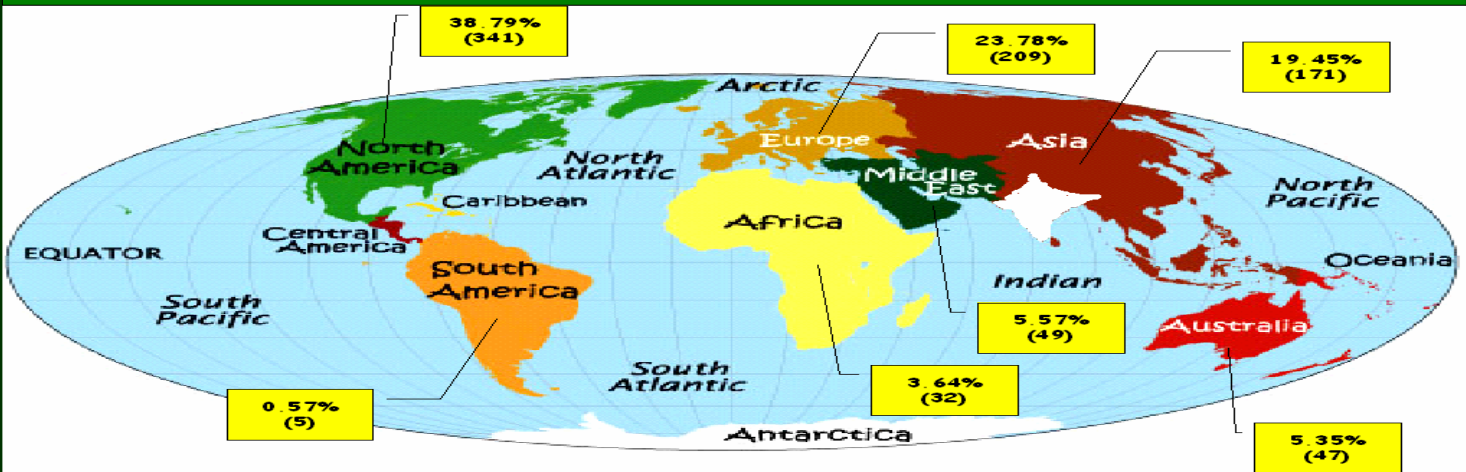


**INFERENCE : MAXIMUM RETURNEES BELONG TO ICT SECTOR**

Countries that accounted for maximum returnees

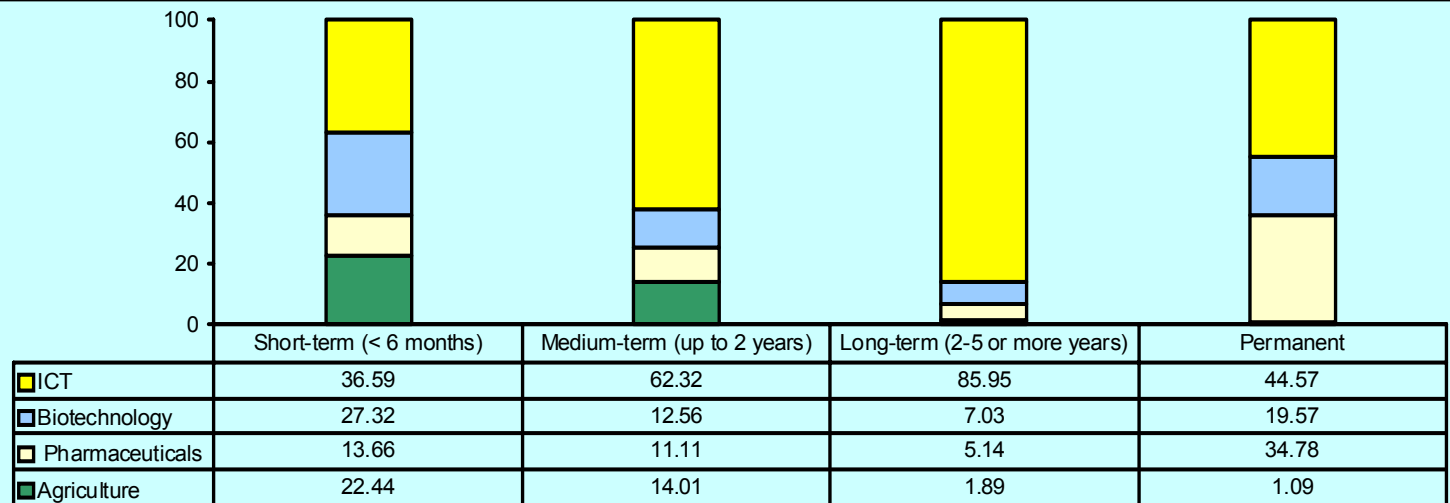
Country	USA	UK	Singapore	Australia	Germany	UAE
No. of RBD / RBG	318	107	44	39	30	29

Returnees' worked in 7 Continents

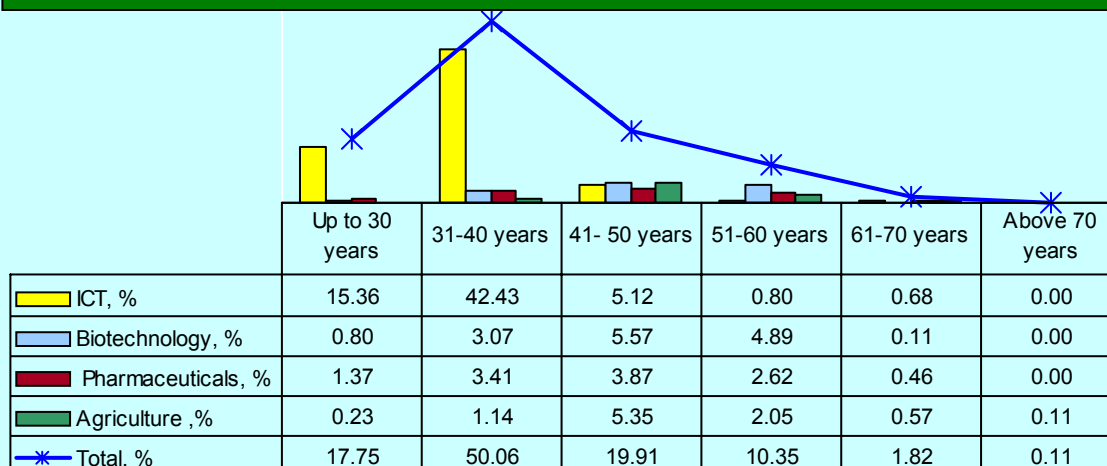


INFERENCE: HAVE BROUGHT WORLD-WIDE KNOWLEDGE TO INDIA

Duration of Stay Abroad of RBD/RBG Returnees in Technological Areas



Age - group of RBD/RBG Returnees in different Technology areas



INFERENCE: HIGHEST RETURNEES FROM AGE-GROUP OF 31-40 YEARS,

*Gender and Age Distribution across Different Technological Areas*

Technological Area & Age	Up to 30 year			31-40 year ✓			41-50 year			51-60 year			61-70 year			Above 70 year			Total year		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
<b>ICT</b>	89	46	135	317	56	373	43	2	45	7	0	7	5	1	6	0	0	0	461	105	566
<b>Biotechnology</b>	4	3	7	22	5	27	39	10	49	29	14	43	1	0	1	0	0	0	95	32	127
<b>Pharmaceuticals</b>	6	6	12	23	7	30	29	5	34	21	2	23	4	0	4	0	0	0	83	20	103
<b>Agriculture</b>	2	0	2	7	3	10	44	3	47	17	1	18	5	0	5	1	0	1	76	7	83
<b>Total</b>	101	55	156	369	71	440	155	20	175	74	17	91	15	1	16	1	0	1	715	164	879

Abbreviations :- M – Male ; F- Female; T- Total      ✓ : Highest coverage under this age-group

*Gender Distribution*

- 81% males and 19% females; covering both genders 64% from ICT;
- BT (20% females and 12% males);
- Pharmaceuticals (approx. 12% each gender);
- Agriculture (11% males against 4% females).

**INFERENCE : SHOWS MALE DOMINANCE IN RBD/RBG RETURNEES**

*Pre-Migration and post-migration proportion of different qualification levels of persons in different technological areas (in %age)*

Selected Technological area	Graduation		Post-graduation		PhD		Post doctoral Research	
	Pre-migration	Post-migration	Pre-migration	Post-migration	Pre-migration	Post-migration	Pre-migration	Post-migration
<b>ICT</b>	39.02	29.12	24.12	32.88	1.25	1.71	0.00	0.68
<b>Biotechnology</b>	0.34	0.11	3.07	2.05	10.35	6.94	0.68	5.35
<b>Pharmaceuticals</b>	2.84	2.39	2.96	2.96	5.35	4.55	0.57	1.82
<b>Agriculture</b>	0.91	0.57	1.25	0.91	6.94	6.26	0.34	1.71
<b>Total</b>	43.12	32.20	31.40	38.79	23.89	19.45	1.59	9.56

**INFERENCE : PG INCREASED IN ICT; POST DOCTORAL INCREASED IN**

### Level of Satisfaction

- ◆ 82% of respondents expressed that they have taken the right decision to return back
- ◆ Highest satisfaction level was expressed by ICT professionals (88%)
- ◆ Lowest satisfaction level was expressed by Agricultural professionals (65%).
- ◆ There was a substantial improvement in academic qualifications of the respondents.
- ◆ Biotechnology area had the major impact. Persons who left with post-graduation came back with PhD or post-doctoral research.
- ◆ Persons, who left with PhD, have returned with post-doctoral research experience.
- ◆ Substantial gain has also been observed in other three areas.

### A Comparison of Job Responsibility in India after Return vis-à-vis Abroad before return

- Technical responsibility is being held by 46.72% returnees back home whereas only 32.42% sample held it aboard;
  - Managerial responsibility is now being held by 39.82% returnees against 8.08% aboard;
  - R&D responsibilities of returnees have depicted a reduction from 17.06% abroad to 3.07% back home.
  - A major shift has been shown from R&D responsibility they held earlier towards managerial responsibility after coming back home.
- ◆ Specialization
- ◆ 60% of the sample attained specialization in Applied Sciences in their respective technological areas.

INFERENCE: RETURNEES SHARE HIGHER POSITIONS OF RESPONSIBILITY

### Spread of RBD/RBG Person across technological Areas and Places

- **ICT** : Hyderabad, Bangalore, Chennai, NCR, Coimbatore, Pune
- **Biotechnology** : Hyderabad, Bangalore, Chennai, NCR, Coimbatore, Pune
- **Pharmaceutical** : Hyderabad, Bangalore,, Chennai , NCR, Patna
- **Agriculture** : Hyderabad, Bangalore,, Chennai , NCR, Patna

INFERENCE: THE SPREAD OF RBD / RBG PERSONS IN INDIA IS IN 14 STATES / UT'S OF THE COUNTRY.

THE BIGGEST CONGREGATION IS IN ANDHRA PRADESH



## SUGGESTIONS & RECOMMENDATIONS

### Key Policy Suggestions / Recommendations

- India needs to understand the pattern of RBG thoroughly and various waves of RBD / RBG from time to time. The sector-specific infrastructural requirements need to be identified and created so that RBD / RBG professionals may utilize that knowledge for building of strong India.
- The study suggests 'Replication of Tamil Nadu Model' in other states. In this Model, Tamil Nadu has developed infrastructural facilities at the district level and has not restricted itself to capital or one / two cities. It has provided wider choices / locations to RBB / RBG persons.
- The study has concluded that a number of changes will have to be made in policies related to sectors of education, research and industry. Among the key issues that are: Universities should have curriculum that involves experts in the process. Herein persons who have returned and are involved in cutting edge research, can play a significant role.
- Separate funds can be earmarked for RBG persons who are interested to undertake research after coming back.
- Industry needs to be motivated to provide incentives to RBG, create own facilitation channels and not dependent solely on government intervention.
- Several issues that were raised require in-depth investigations. The scope of study should be widened to cover more technological areas. The study needs to cover issues of entrepreneurship, effect on different industry segments and research more intensively. This primary survey can provide the background to undertake a further case-based study. It will help in articulating specific policy inputs to catalyze the RBG process.

STUDY CONDUCTED BY

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- **NRIF** expresses its gratitude to NSTMIS, DST, MoS&T, Gol, for initiating and sponsoring this study. Our thanks are due to Members of the LPAC (Local Project Advisory Committee) and other officials of the NSTMIS for their invaluable cooperation and advice during the period of this study.
- **NRIF** gratefully acknowledges the candid technical input provided by the professionals, respondents, eminent scientists, academicians, researchers in government, private institutions and laboratories,