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BRAIN DRAIN STUDY AT I. I. T. KANPUR

OPINIONS AND BACKGROUND OF FACULTY AND SENIOR STAFF

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AT

IIT KANPUR

Opinions and Background of Faculty and Senior Staff

by

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July 1969

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Opinions and Background of Faculty and Senior Staff

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A. INTRODUCTORY NOTE

Quite a number of studies exist dealing with the general subject of international migration of highly skilled persons - brain drain. Generally these studies concentrate on the demographic aspects. This approach has the great advantage of dealing in facts and not in emotional arguments but it is not entirely satisfactory. The trouble is that the facts tabulated - numbers of migrants, subject fields, dates, etc. - are a summary of results, not a study of causes. Each man's decision to migrate is caused by a multitude of factors. If knowledge of the situation is to give us the power to control it we must have knowledge of causes. These causes are psychological (in the individual) and sociological (in the occupational group and in the home and host countries) and are not obvious, simple, uniform over the sample group, or time-invariant. The brain drain literature dealing with causes is mostly of the essay type, giving the opinion and argument of the writer, which means that it is hard to separate what is true from what is reasonable (but not necessarily true or relevant), or to weight various factors in a quantitative way.

The style of the present study is intermediate between the two approaches above. It is aimed at discovering causes by tabulation of responses to a questionnaire which asks about personal motivations and for opinions about the motivations of others. Specific response choices are provided in order to force the results into a quantifiable and intelligible form. Naturally this approach will work only if the response choices provided for each question are a reasonably complete set (in the mathematical sense). There should not be much redundancy either. In all but a few questions this was achieved, as judged by lack of recurring themes in the write-in responses.

The data consists of a little over 200 responses to a questionnaire distributed to faculty and senior staff at the Indian Institute of Technology Kanpur in April 1969. The idea was that something useful about the problem of brain drain could be learned by collecting opinions and background data from this group. A large number of the group have had foreign training and experience, and thus are people who chose to return to India rather than remain abroad and be a part of brain drain when they had the opportunity. Of the remainder, most possess skills which are salable in the western countries and thus could be regarded as potential 'drainees'. The project, and its intended purposes, may be

appreciated from the cover letter which accompanied the questionnaire (reproduced here with minor editing):

- Cover Letter -

Dear Friends and Colleagues:

We have here at Kanpur a sizable population of scientists, engineers and other professionals who have returned to India after education or employment, or both, in one of the so-called 'developed countries'. Many of you in fact were recruited directly into IITK from abroad. For a number of reasons, discussed below, it would be helpful to know what brought you back. This would help to understand, perhaps, why so many others do not come back.

Specifically, the attached questionnaire is oriented toward the following questions:

1. What are the characteristics of the returned population at IITK in terms of age, training, family background, etc.?
2. What are the effective influences which motivated the return of this population to India after education, and/or professional employment, in the developed countries?
3. What were the effective incentives which brought all of you to IITK specifically?
4. What is the profile of the faculty and senior staff generally?
5. What are your views on questions related to brain drain from India?

The answers to these questions have significance to IITK specifically and to India generally. They are also of special interest to Americans who are concerned with the effectiveness of USAID educational programs. Moreover, I personally find them interesting in their own right.

Considering first the relevance to IITK specifically, it would be interesting to know which of the various recruiting incentives and reasons for choosing this campus were the most important to the individuals recruited. We might be able to improve our ability to recruit the people we want.

There is of course the much publicized problem of brain drain. It has been estimated by some that the value of the human resources represented by the net

flow of talented and educated people from the developing countries to the developed countries substantially exceeds the value of the technical assistance and material goods flowing to the developing countries in the form of aid grants and long term credits. Moreover, it is sometimes claimed that foreign aid is partially responsible for the brain drain, and thus is, in some measure, counter productive. It is not at all clear to what extent this is true, but there does seem to be some basis for argument. For example, it is true that a substantial number of graduates from this campus, a major USAID project, leave India to do postgraduate study in the United States. Experience in the United States is that foreign students often do not return to their home countries after completion of studies. A recent study at Berkeley⁽¹⁾ showed that, of all foreign students obtaining doctorates at Berkeley in the College of Engineering in the eleven year period 1954-65, two thirds were still living in the U.S. in 1967. According to another study⁽²⁾ made by an investigating subcommittee of the U.S. House of Representatives, nearly half of the 7900 scientists, engineers and physicians entering the U.S. labor force in 1967 from the developing countries had originally come as students with the declared intention of returning home after receiving their education.

The report of this U.S. Congressional committee makes it clear that the problem is regarded quite seriously in the U.S. The committee noted that in 1967 the U.S. spent \$75 million toward providing 5400 trained persons (the undersigned among them) to the very countries engaged in 'exporting' some 5200 of their own scientific professionals. To control what they regarded as a frustrating situation, the committee recommended that USAID curtail training and sending of technicians to a developing country in any field in which there is concurrent emigration, unless the country takes 'reasonable corrective measures' to halt the outflow. Proposals to regulate emigration - i.e., stop the brain drain by sealing the borders - have also been heard from the Indian side⁽³⁾.

"The U.S, or Indian government may well come to the conclusion that some definite measures are necessary to control the brain drain. The views and experience of this sample would be especially valuable in that event. Positive incentives to increase the fraction of foreign trained Indians who return would seem preferable, and more compatible with Indian and American democratic traditions, to negative 'iron curtain type' measures restricting the number allowed to go out..."

This first report is being written under a definite time limitation and is intended to convey only the more straight forward tabulations from the questionnaire. A minimum of interpretation has been attempted and no graphic presentations are given. What remains for the future* is to analyse the questionnaire data more intensively both by correlation of responses to different questions and by study and appreciation of the large number of individual comments, and to properly digest the abundant literature.

Some persons have expressed curiosity about my personal motivation in undertaking this study**. My personal motives are (1) academic curiosity, (2) hope of developing information which will be helpful in building IIT Kanpur and other institutions like it, and (3) desire to make a contribution to a widely discussed subject by studying it from a new angle.

* It is expected that a scientific paper or more extensive report, or both, based on this survey will be published at some future time. I will be happy to send copies to all who indicate their interest to me, in writing.

** For example I was asked whether I intended to take part in Indian politics. (The answer is 'no' - I would be hopelessly outclassed!)

B. BRAIN DRAIN FROM DEVELOPING COUNTRIES (ESPECIALLY INDIA)

Much has been written about the brain drain problem but a number of questions remain unanswered. The most basic question is whether there is in fact any problem at all. Without any doubt there are a large number of scientists, engineers and physicians now working in the western countries who received all or part of their education in the so-called 'developing countries'.* What is unclear is whether this is a bad thing for those countries, or at least whether it is as bad as sometimes claimed.

On the one hand there would certainly appear to be a net capital loss to any country when a talented individual, after 20-25 years or more as a non-productive child and student, emigrates to USA, for example, to perform his productive labours there. It is just the same as if capital equal to living cost plus direct educational investment (all at compound interest over varying portions of the 20-25 years) had been removed from the country by a plundering conqueror or expended in a useless war. Although the developing countries may sometimes appear to have a surplus of people, no one would say they have a surplus of capital. Moreover the capital removed (the 'brain') is a form of investment which requires a long time to put together and which is capable of paying very high returns. Perhaps it should be valued even more highly than the equivalent amount of cash capital.

On the other hand, from the point of view of the individuals involved, or even of responsible policy makers and leaders, it usually seems that there is no important net loss to the developing country at the time a trained individual emigrates. This is because (from the individual's viewpoint) there are not enough suitable jobs to go around, which is to say (from the national viewpoint) that the availability of trained manpower of the type which is emigrating is not a limiting factor in development. Thus, to take one example, the need for civil works in India today is enormous. Roads, bridges, dams, structures - a 10 fold or even 100 fold increase in engineering and construction activity would still not bring the country to modern levels for a long time. However it does not necessarily follow from this that the emigration of civil engineers should be discouraged or prohibited. There are thousands upon thousands of unemployed or severely under-employed civil engineers in India. The limiting factor is capital in cash form

* There is also brain drain from one developed country to another, e.g., U.K. to U.S.; in this report we do not consider this problem.

to pay for the badly needed civil works. These civil works are economically productive only after completion, and even then some years of use are required before the cost is amortized. The investment made by India in the 'brains' - the civil engineering graduates - would appear, in this example, to have been less than an optimum allocation of resources, from a strictly economic and short term point of view. Note that, according to the above, brain drain results from the very shortage of investment capital that is practically the definition of 'underdeveloped country'. If investment x is required to train a civil engineer, then $5x$ or $10x$ must be available for investment in civil works each year after he joins the labor force, in order to keep him professionally employed. From this perspective, when a developing country permits brain drain to occur it is doing nothing worse than writing off a premature and unproductive investment.

Neither of these viewpoints completely encompasses the situation. For one thing, trained professionals are not always in abundant over supply in the developing countries. This is especially true if one considers the distinction between 'qualification' and true professional competence. Even if a certain specialized profession is in definite under supply, some tendency to 'drain' will still exist, since the rich country can afford to outbid the poor country for a pool of talent needed by both. For another thing, the investment is made by family and state but the decision on whether or not to leave the developing country is made by the man himself. It is he who reaps the benefits of emigration and the family and state who suffer the loss. Another aspect is that investment in child-rearing and education is seldom totally lost if the man remains in the country. Thus, in the case of the civil engineers discussed earlier, proper jobs in civil engineering may not be at hand, but the man can often take up a post for which he is over qualified, displacing some other individual downward to a job for which he is over qualified, etc. This situation, which presumably will occur if the surplus of civil engineers is not removed by emigration, and if social obstacles are not too great, results in partial waste of the specialized civil engineering features of the education. However only a small portion of the total investment is affected - the child-rearing part of the investment is required in any case* and the mind-stretching, citizen-building, general background part of the education remains useful. Thus the term 'writing off an unproductive investment' does not entirely fit the brain drain situation. If the

* No cure for this except family planning.

individual leaves the entire investment is lost; if he does not leave, but remains in an under employed status, only a part of it is lost, perhaps a rather small part.

To add to the confusion, brain drain may have advantages. An immediate advantage to the developing country occurs if the emigrants send remittances home. Quantitatively the amount of this is not accurately known for India**.

Another advantage may come somewhat later, if the individuals who leave eventually return after some years of higher education and experience in the western country. Many of these individuals take up important posts in their home country and become an effective agents of change and improvement. This is a matter of common observation in scientific and educational circles in India. The situation of 15 years ago, in and near Bombay, has been studied and reported in a very interesting book⁽⁴⁾.

If conditions in the home country - the developing country - take a turn for the better and the job situation improves (which is to say, the 'brains' are needed at home) some of the emigres may return. If this happens to a significant extent the developed country can be viewed as a place to store the 'brains' against possible future requirement. Training and useful experience occurs during the storage period, so the brains are not only stored but upgraded, without cost to the home country. Thus brain drain can be viewed as advantageous to the home country.

This last view - that brains are not being 'drained', but only stored, is pure fiction unless top quality people of the type required do in fact return at the time they are needed. On the operational level this means that the institution or department that has the job openings must be able to recruit talented and experienced people from abroad and it must be able to do so within a reasonable time, say one year. If the recruiting from abroad is too slow or ineffective, the openings must be filled with whoever is available. The question of how to attract the brains back to their home country (i.e., India) thus appears. What are the incentives which draw people back, against steep salary

** It could be known. The Reserve Bank, by scrutinizing transactions over a representative three month or six month period could identify the personal remittances from Indians residing abroad, and by investigation determine which were coming from 'brains', in the sense this term is used here.

differentials, from jobs in the developed countries? What fraction of the 'brains' can be recruited back to India? Does it depend on how long they have been abroad?

The conclusion to be drawn from these general remarks is that the 'problem', if there is one, is not very well defined at present. The many and partially contradictory aspects have weights which depend upon unknown information (extent of remittances, importance of general education in a developing country, etc.) It is not at all obvious whether or not a problem in the sense that something should be done about it, does exist at the present time. This point is important because: (1) Recognition of an important and unsolved question is the first step toward answering it; (2) There is no doubt at all that many people in both the developing and developed countries feel that brain drain is a very serious problem and that strong steps to curb the out flow of trained persons from countries like India should be taken without delay; and (3) scientists, technologists, physicians, and others in the 'brain' category would likely find their personal interests and freedoms adversely affected if the government actions currently being proposed on both sides should materialize.

C. QUESTIONNAIRE SURVEY AT IITK KANPUR

C.1. Methodology, Sample, Response

The method used was questionnaire with personal followup.* A questionnaire was prepared, refined, and pre-tested, and eventually sent to all faculty (Senior Professor to Associate Lecturer), selected non-academic staff above a certain responsibility level**, and certain others having Ph.D. or equivalent (pool officers and postdoctoral research fellows) who were with the Institute and not on leave on 6 April 1969. Total sample numbered 225, of which 6 were women. Return envelopes were coded so that respondents could be identified. Thus it was possible to follow up cases where the questionnaire was not returned. Considerable effort was put into this, and eventually more than 92% of the questionnaires were returned. Use of the return code also made it possible to clear up ambiguities in responses to individual questions. These arose in 10-20% of the questionnaires, either because a question was framed in a confusing way or because the respondent failed to read the instructions. Respondents were contacted by mail in such cases, unless the mistake could be corrected from publicly available sources***. Used with this kind of followup the questionnaire method can approach interviewing in completeness of response. From the point of view of getting open answers to sensitive questions, evaluating responses objectively, and maintaining comparability of conditions of questioning, questionnaire with followup may have some advantage over interview.

* In a handful of cases (fewer than five), at the request of respondent, the information was taken by interview.

** Thus, for example, Assistant Registrar, Stores Officer, Accounts Officer were included, while their subordinates were not. The acting supervisors of central workshop, graphic arts, library, maintenance, and construction units were included. All medical officers were included. Senior stenographic and secretarial personnel were not included, even though their salaries were sometimes higher than those of people who were. At his own suggestion the Director of the Institute was not included. Non-Indians were not included.

*** Examples: By typographical error the category "Assistant Professor" was omitted in the 'what is your present academic rank' question, and some Assistant Professors checked Associate Professor, or else left the question blank.

By 22 April, 12 days from mailing date, 82 questionnaires (37%) had been returned, and the response rate had dropped to 4 or 5 per day. A first reminder letter was then mailed to all non-respondents. By 30 April response had reached 61% and was increasing at a negligible rate. Personal reminders, both verbal and written, reduced the non-respondents to 44 by 10 May. Active efforts to recover the questionnaires were discontinued on 30 May. On 12 June the survey was closed, with a total response of 206 out of 225, or 92%.

Respondents took the questionnaire seriously. Frequently it could be seen that first responses had been crossed out and changed after reflection. Extensive comments were made by about 20% of respondents. Six individuals refused to fill out the questionnaires, giving reasons which were not very illuminating in spite of, in some cases, being put forth at some length. It seemed to us* that the reasons varied from 'can't take the time' to 'nothing good can come from a study like this, and I don't want any part of it'. In addition to these six refusals, 13 others failed to respond by the cutoff date, giving a total of 19 non-respondents. Fortunately it was possible to gather enough information about the non-respondents to classify each of them by position held, general field and foreign experience.

Questionnaire information was coded and keypunched by two different persons* independently. Coding and punching mistakes were found by comparing the two sets of IBM cards.

The first two questions on the questionnaire were used to sort out the sample by rank, field, and type of professional activity. Rank and function of non-respondents could be determined in every case, thus the classification in Table 1 covers the complete sample.

* myself and my wife.

=====

TABLE 1. Classification of Sample, including Non-Respondents

ACADEMIC STAFF	E	S	H	T	A	Total	Subtotal	
Senior Professors	3	2				5		
Professors	10	6	2			18		
Associate Professor	10	1	1			12		
Assistant Professors	49	31	9			89		
Lecturers	32	21	5			58		
Associate Lecturers	3	4	3	1		11		
Post-doctoral Fellows		6				6		
Research Associates ⁽¹⁾		1				1		
Pool Officers		1				1		
TOTAL ACADEMIC STAFF							201	
NON-ACADEMIC STAFF								
Medical Staff				5		5		
Administrative Staff ⁽²⁾				4	7	11		
Professional Staff ⁽³⁾	2			6		8		
TOTAL NON-ACADEMIC STAFF							24	
TOTAL SAMPLE							225	

(1) Research Associate is an elastic rank, used to cover temporary appointments.

(2) Administrative Staff means Director's Branch, Registrar's Branch, Accounting, Plant Maintenance and Construction etc. Deputy Director, Deans, Department Heads have been included under academic staff.

(3) Professional Staff means Pilot, Computer Programmer, Instrumentation Engineer, Librarian, Superintendent of Workshop, Graphic Arts, etc.

E = Engineering (including applied mathematics and computer science)

S = Science (including pure mathematics)

H = Social Science, humanities, arts

T = Technical services, medical services, library, etc.

A = Administration

=====

The 19 non-respondents were all from the academic staff, and were distributed over the sample as follows:

=====

TABLE 2 : Distribution of Non-Respondents

	E	S	H	TOTAL
Professors		1	1	2
Associate Professor		1	1	2
Assistant Professors	5	2	1	8
Lecturers	3	2	1	6
Post-doctoral Fellows		1		1
TOTAL:	8	7	4	19

=====

For meaning of E, S, H see Table 1.

=====

The sample of 'brains' at IIT Kanpur has been collected not only all in one place, but also over a fairly short interval of time. This is shown in Table 3.

TABLE 3 : Year of Joining IITK

YEAR OF JOINING	Total sample	GENERAL FIELD					ACADEMIC					NON-ACADEMIC		
		E	S	H	T	A	Assoc. Prof. & above	Asst. Prof.	Lectr.	Below Lectr.	Total Acad.	M & P ⁽¹⁾	Admn.	Total Non-Acad.
1960	15	3	7		1	4	1	2	5	2	10	1	4	5
1961	16	6	8		1	1	3	2	7	2	14		2	2
1962	10	3	7				3	3	4		10			
1963	25	15	5	4	1		18	4	2		24	1		1
1964	28	12	7	4	4	1	2	16	3	3	24	2	2	4
1965	30	17	6	3	4		3	16	6	1	26	2	2	4
1966	26	15	8	2	1		3	12	6	3	24	2		2
1967	34	20	10	3	1		1	15	15	2	33	1		1
1968	37	17	13	4	2	1	1	18	8	6	33	3	1	4
1969*	4	1	2		1			1	2		3	1		1
Total	225	109	73	20	16	7	35	89	58	19	201	13	11	24

(1) M & P Medical and Professional

* 1969 up to survey date (6 April 1969) only

For meaning of E, S, H, T, A see Table 1

C.2 Foreign Training & Experience

a) Distribution and Extent of Foreign Experience

It was of course known at the outset that many of the IIT Faculty and some of the staff had foreign education and experience. That was one reason why it was thought worthwhile to study this particular group and collect their opinions.

Q. 7(a) Have you spent a year or more in one of the developed countries listed below, subsequent to reaching your 16th birthday?

=====

TABLE 4 : Foreign Experience in the Sample

	Complete Sample	ACADEMIC STAFF				NON-ACADEMIC STAFF			
		Lectr. & Below*	Asst. Prof.	Assoc. Prof. & Above**	Total Acad.	Medical Staff.	Profes-sional Staff	Admin. Staff	Total Non-Acad.
YES	141	23	81	33	137	2	2		4
NO	84	54	8	2	64	3	6	11	20
TOTAL	225	77	89	35	201	5	8	11	24

* 'below' means Associate Lecturer, Postdoctoral Fellow, Pool Officer or Research Associate.

** 'above' means Professor and Senior Professor

=====

Those answering 7(a) in the affirmative were asked to list the country or countries in which they spent a year or more.

Q.7(b) Which country? (check all in which you spent a year or more.)
(a check list of the developed countries was given)

Two respondents gave all the countries they had visited, these are listed as 'confused' in the table.

=====

TABLE 5 : Country where Foreign Experience was Obtained

Response to Q. 7(b)	Complete Sample	Academic Only	Non-Academic Only
USA	112	111	1
UK	25	23	2
Canada	9	9	
Australia	1	1	
France	1	1	
Germany (West)	2	2	
Germany (East)	1	1	
USSR	2	2	
Switzerland	2	2	
Netherlands	2	2	
Confused	2	1	1

Note: Responses do not total to the size of the sample, because some respondents spent a year or more in more than one country.

=====

A high percentage (63%) of the academic staff have had foreign experience, meaning either work experience or education, or both. If Lecturers, Associate Lecturers, Post-doctoral Fellows, Pool Officers and Research Associates are excluded, then the remaining group of Assistant Professors and above, the backbone of the IIT Faculty, is 92% foreign trained. As might be expected, it is quite a different story for the non-academic staff. None of the administrative staff in the sample have had foreign experience* and only four of the medical/professional staff have been abroad.

* The criterion of 1 year or more in the developed country excludes at least one administrative staff member who spent about 8 months in USA on the USAID Participant Program.

Foreign experience from 10 countries is represented at IIT-Kanpur, with USA, UK, and Canada accounting for more than 92% of the cases. USA alone accounts for 71%.

b) Types of Foreign Experience

We can ask "What is the nature of this foreign experience? Is it study, or employment, or both?" We consider the frequency of the two most common patterns.

Pattern No. 1. Student completes B. Tech., B.E., M.S. or equivalent then goes abroad to obtain doctorate. After obtaining it he returns to India either immediately or after working for some time.

Pattern No. 2. Student completes all under-graduate and post-graduate work in India and receives Indian doctorate. Then, either immediately or after some time, he goes abroad for a few years of post-doctoral employment and returns to India.

=====

TABLE 6 : Patterns of Foreign Experience

	Total Sample	ACADEMIC STAFF				Total Acad.
		Asst. Prof. and above	E	S	H	
Pattern No. 1	104	92	66	30	8	104
Pattern No. 2	21	16	4	15	2	21
Other Patterns and NR	16	6	5	3	5	13
Total	141	114	75	48	15	138

Pattern No. 1 is certainly by far the most common, as would be expected from common experience. Pattern No. 2 (going abroad after receiving doctorate) is confined mostly to the sciences. Doctorate programs in the sciences are more numerous and better established in India than doctorate programs in engineering. Students going to USA for doctoral work and remaining after completion of studies are one of the main components of scientist/engineer brain drain into the U.S. from developing countries. Apparently even after many are drained off there are enough good ones left to meet present Indian needs.

c) Extent of Foreign Experience

Questions were asked to find out the extent of foreign experience, with the results shown in Table 7.

=====

TABLE 7 : Duration of Foreign Experience

YEARS	Complete Sample		PATTERN NO. 1		PATTERN NO. 2
	Total Time Abroad	Worked After completion of studies	Total Time Abroad	Worked after completion of studies	Time worked after completion of studies
did not work		41		37	1
0-0.99		17		11	5
1.00-1.99	8	31		29	2
2.00-2.99	8	9	5	7	1
3.00-3.99	28	14	18	6	7
4.00-4.99	23	6	17	2	3
5.00-5.99	27	2	23	2	
6.00-6.99	14	3	14	2	1
7.00-7.99	9	1	8		
8.00-8.99	10		9		
9.00-9.99	2		2		
10.00-10.99	3		2		
11.00-11.99					
12.00-more	5		4		
NR*	4	17	2	8	1
Total	141	141	104	104	21

* But had been abroad

=====

The interesting thing in Table 7, aside from noticing the total amount of foreign experience collected at IITK, which is impressive, is the fact that there are quite a number of cases who have been abroad for quite a long time. About 15% have eight years or more of foreign experience. The median time is about five years. Aside from the educational or professional purpose of the stay, exposure to Western values and approaches must have been substantial over such long exposures.

The question was asked:

Q. 8(a) : How many times have you been outside India for education or employment subsequent to reaching your sixteenth birthday? Disregard short visits, ^{or} short return visits to India, which were less than 12 months long.

=====

TABLE 8 : Number of Times Abroad

	Total Foreign Experienced	Academic Only	Non-Academic Only
One time only	121	118	3
Twice	16	16	
More Than Twice	2	2	
Unusable Response or NR (but respondent had been abroad)	2	1	1
Total	141	137	4

Q. 8(d) : How many years did you spend outside India/Pakistan before age 20? was asked in order to pick out the respondents who had international rather than Indian backgrounds. It turned out that there were none of these. Excluding the ones who left at age 18 or 19 to study abroad, and one more who grew up in Burma, presumably in an Indian environment, it would seem there were only 4 and they averaged only two years each outside the country.

=====

TABLE 9 : Experience Abroad Before Age 20

	None	NR	0.1-2.0*	2.1-5.0	5.1 + Total
Years outside India before age 20	119	15	4	2	1
					141

* Of these, 2 were cases who left at age 18 or 19 to begin extended graduate study abroad.

=====

Thus none of the respondents had international backgrounds and, except in so far as that fact alone is interesting, the question was unnecessary.

d) Attitudes toward Foreign Experience

Several questions were asked in an attempt to probe so-called 'psychological' variables, rather than the more objective sociological ones. The reliability of responses is less in this case, though importance of the question may be greater. Sometimes it is even difficult to ask the question in a way which does not bias the respondent toward one of the allowed answers. However, the relevance for understanding of the brain drain phenomenon is very great. An individual's future actions are highly correlated with his present attitudes.

Only the sub-sample which did spend a year or more in a developed country* was asked to respond to the following:

Q.13 : Would you say that your stay in the developed country was

A an enjoyable experience

B enjoyable to begin with, but I was glad when the time came to return to India

C Not particularly enjoyable, but a good opportunity

D Not much fun

* If a respondent answered 'No' on Q.7(a) he was told to proceed straightway to Q.23 and skip all the intervening questions. Thus for questions 7(b) through 22 a sub-sample of 141 is relevant, rather than the full sample of 225 (See Table 4).

TABLE 10 : Attitude Toward Personal Foreign Experience

Response to Q.13	Total Foreign Experienced	ACADEMIC		Married Status				
		Asst. Prof. and above	Total Acad.	Total Non-Acad.	U	M	N	NR
A	85	69	83	2	35	8	41	1
B	28	24	27	1	10	8	10	
C	13	8	12	1	7	4	2	
D								
Other*	2	2	2		1		1	
NR**	13	11	13					13
TOTAL	141	114	137	4				

* write-in responses

** Not responding to this question, but had been abroad

For meaning of A,B,C,D see statement of Q.13, above.

U = unmarried while abroad

M = married, spouse remaining in India

N = married, spouse with respondent in the developed country for at least part of the period.

In Table 10, much the largest number remember their stay in the developed country as 'an enjoyable experience'. Considering that both nostalgia and (in some, perhaps) the tendency to say what is expected or what the questioner would probably want most to hear are working in favor of this response, it may be that the number should be discounted somewhat. The correlation of the A and B responses with whether or not the wife remained behind in India is certainly clear.

There were three questions with "yes - no" response choices.

Q. 12 : Did you seriously consider remaining longer (for a year or two, or more) in the developed country, rather than returning to India when you did?"

Q. 21 : Suppose IITK did not exist. In your best judgement would you probably have returned to India anyhow, at about the time you did?

yes, would probably have returned to India at about the time I did.

no, would probably have remained in the developed country, at least for a year or two more.

Q. 22 : If you had it to do over, knowing what you know now, would you have returned to India when you did?

yes

no

=====

TABLE 11 : Decision to Return to India

	Total Foreign Experienced	ACADEMIC STAFF		
		Lecturer and below	Asst. Prof. and above	Total Acad.
Q.12 : Yes	49	7	40	47
No	79	14	63	77
Other*				
NR**	13	2	11	13
TOTAL	141	23	114	137
Q.21 : Yes	92	16	73	89
No	33	4	28	32
Other*	1	1		1
NR**	15	2	13	15
TOTAL	141	23	114	137
Q.22 : Yes	82	11	68	79
No	39	9	29	38
Other*	4	1	3	4
NR**	16	2	14	16
TOTAL	141	23	114	137

* 'Other' means "maybe", "perhaps", "yes and no", "depends" etc. These were write-in responses.

** NR means not responding to this question, but had been abroad.

=====

The responses to all three of these questions indicate that a big majority of respondents were drawn back to India by reasons independent of the existence of IITK, and that their return was not in doubt at the time, and is not regretted now. This is certainly very encouraging for anyone worried about brain drain and provides good support for those who argue that international migration of talented people should not be viewed as a problem, but simply as an adjustment to job conditions.

We can keep in mind two points on the other side. First, though the majority is 2-2½ to one, the minority is not negligible. If the 39 individuals who answered 'No' on Q.22 were to disappear overnight they would certainly be missed. Taking the strongest possible view, Table 11 suggests that an appreciable amount of the nation's technological base is resting on persons who are not sure they want to be part of it. (This last claim goes somewhat beyond the wording of Q.22.) Second, it is a general phenomenon that if you ask anyone if a decision he made in the past has turned out to be correct, he will most often say "yes, the choice I made was by far the best of the alternatives", though he will admit to having been uncertain at the time. We all have a tendency toward rationalization of past decisions - protective self-deception. Bearing this in mind, the 'No' response on Q.22 seems disturbingly large.

Some developing countries have made a point of building one or two special centers of excellence at high cost with the avowed purpose of inducing expatriate 'brains' to return. If the response to Q.21 is taken seriously, and I believe it should be, there is no need to build such centers for this reason in India at least. The 'brains' will return anyway. Building of centers of excellence should be justified on the basis of expected beneficial effects on the educational and technological base of the country. The distinction can have important effects. For example, suppose the location of a proposed center of excellence is to be decided. Fixing it at Ootacamund, say, would be fine for attracting staff, but not ideal for influencing the technological and educational development of India.

Another question, bearing on attitudes toward foreign study or work experience, which was asked to all respondents, not just those who had been abroad, was

Q. 27 : Will you try to send one or more of your own children outside India to a developed country for work or study?

- A Yes, that is my plan.
- B No, I don't think it would be desirable.
- C Probably not. It would be desirable, but I don't see how I am going to manage it.
- D Don't know.
- E No children at present; never considered the problem.

The reaction to this question was strongly positive (see Table 12).

=====

TABLE 12 : Desirability of Foreign Experience

Response to Q.27	Total Sample	Foreign Experience		ACADEMIC		Total Non-Academic
		YES	NO	Asst. Prof. and above	Total Acad.	
A	62	47	15	39	53	9
B	8	3	5	3	8	
C	17	6	11	6	11	6
D	52	40	12	39	48	4
E	57	30	27	22	54	3
Other	6	1	5	1	4	2
NR	23	14	9	14	23	
TOTAL	225	141	84	124	201	24

For meaning of A, B, C, D, E see Q. 27, above

=====

The response to this question is, in a sense, inconclusive, since the two 'don't know' answers are each comparable in frequency with the 'yes' answer. Still, it is interesting that the 'yes' answer is so much stronger than the 'no' answer. Asking the same question on a campus in USA would not yield this result.

The foreign experienced group (as might be expected) and the non-academic group (which would not have been expected) seem the most strongly convinced of the value of foreign education.

C.3. Views on Brain Drain Problem

a) General Importance

As discussed earlier, it is not completely clear that the emigration of trained people from a developing country such as India causes bad consequences. Most of the publicly expressed opinions - those of journalists in particular - are to the effect that brain drain is a serious problem for the developing countries and that something must be done to stop it if development is to proceed. No one seems to have asked the 'brains' themselves, who presumably have done some thinking about the problem from time to time.

The question was put in the following way:

Q. 29 : "Do you personally feel that (check the most true statement, only one):

- A Brain drain is a serious problem for India, contributing to many of the other problems.
- B Brain drain will take care of itself if progress is made on development generally, and it is useless to attack it as a separate, special problem.
- C Brain drain as a problem does not really exist. The world is a closed system, and each individual should go where his talents and inclinations lead him.
- D Brain drain is an asset to India. There are no suitable jobs here; by exporting brains we store and upgrade them against the day they may be needed; meanwhile they earn foreign exchange and enrich the country by sending remittances home.
- E Brain drain

(Write your own one or two sentence statement)

The response to this question is as shown in Table 13 (following page).

=====

TABLE 13 : Is Brain Drain a Problem for India?

	All Faculty and Staff			Academic Staff			Non-Academic Staff			
	Total Sample	Foreign Experience		Total Acad. Staff.	Foreign Experience		Asst. Prof. and above	M&P*	Admin.	Total Non-Acaa.
		YES	NO		YES	NO				
A	17	10	7	15	10	5	11	1	1	2
B	108	68	40	95	66	29	55	6	7	13
C	38	20	18	32	19	13	18	4	2	6
D	21	16	5	19	15	4	14	2		2
E**	20	15	5	19	15	4	14		1	1
NR	21	12	9	21	12	9	12			
TOTAL	225	141	84	201	137	64	124	13	11	24

(For meaning of A,B,C,D,E see statement of question on preceding page. NR = no response .)

* M & P = Medical and Professional Staff

** Some of the "E" responses were the following (there were many others):

"Is a minor problem compared to the lack of utilization of the brains that are available here".

"Is a problem in that a lot of money is spent training these people. The money could have been better spent, but there is no use asking them to return because there are no jobs here".

"A symptom rather than the disease - namely the lack of an atmosphere of intense intellectual activity".

"Nothing can be done about it. It's an inevitable consequence of being poor".

=====

There seems to be no doubt that an over whelming majority of the sample feels that brain drain is not a serious problem for India, that it will take care of itself if progress is made on development generally, and that there is no use attacking it as a separate, special problem. In fact a substantial number regard it as an asset. This result is of considerable interest because: (1) It is completely at odds with the prevailing wisdom on the subject - wisdom expressed frequently in official circles, and sometimes put forth as the basis of proposed new regulations or laws; and (2) because it is coming from the 'brains' themselves. The opinions of, for example, the academic staff with foreign experience, are based on rather direct contact with the realities of the Indian and foreign situation. One might expect that there might be some validity in them.

On the other hand, we should not suppose that these opinions represent absolute truth just because of their source. The qualifications of IIT faculty and staff are impressive but these qualifications are not particularly in the field of development or manpower planning. Also, as mentioned earlier, benefits of brain drain accrue directly and immediately to the individuals concerned, whereas adverse effects on development, if any, are spread over a large population, occur over a longer time and are less direct and obvious. Perhaps it is unrealistic to expect complete objectivity on this question from respondents so deeply involved personally. Even with complete conscious honesty, unconscious bias can destroy objectivity.

b) Why Professionals leave India for the Western Countries.

In addition to asking for a general opinion about whether or not brain drain was a problem, respondents were asked to treat it as a reality and pick out the reasons for it. The question was:

Q. 30 : In your opinion, what are the most important reasons for the brain drain so far as Indians you know are concerned. Give three reasons and three only, indicating the order of these three by putting a '1' in the box for the most important, a '2' in the box for the next most important, and '3' in the box for the least important reason of the three .

- A Better standard of living in the developed countries
- B lack of a sufficient number of professional openings in India
- C feeling that 'the best Indians go to the West, so if I want to consider myself in the top category I must prove it by going there. If I stay in India I'm not really in the first league.
- D A professional man is 'respected more and treated better' in the developed countries than he is in India
- E better opportunity for using professional skill - i.e. more chance to do research, better research facilities, more challenging engineering projects, etc.
- F influence of fellow students or fellow workers in the developed country
- G preference for culture of the developed country
- H life in India is just not very exciting
- I good chance to escape from family situations
- J desire to earn a high salary, at least for a few years, in order to be able to send money to relatives or friends in India
- K desire to earn a high salary and hold an important position, at least for a few years, in order to be able to return eventually to India at a higher level than would be otherwise possible

Other _____

=====

TABLE 14 : Reasons for Brain Drain

Reasons Given (Q.30)	Total Sample	Foreign Experience		ACADEMIC		NON-ACADEMIC		
		YES	NO	Asst. Prof. and above	Total Acad.	M & P*	Admin. Staff	Total Non-Acad.
(Total No.)	(225)	(141)	(84)	(124)	(201)	(13)	(11)	(24)
A	243	165	78	141	221	14	8	22
B	248	173	75	150	227	7	14	21
C	37	13	24	10	32	2	3	5
D	77	44	33	32	61	13	3	16
E	273	189	84	158	245	21	7	28
F	16	6	10	6	15		1	1
G	12	8	4	8	11	1		1
H	11	7	4	7	11			
I	7	3	4	2	6	1		
J	61	26	35	26	52	1	8	9
K	153	80	73	71	131	7	15	22
Other	48	24	24	31	41		7	7

Numbers given (except for line 1) are scores, computed by giving three points each time the reason was cited as most important, two points each time it was cited as second most important and one point each time it was cited as third most important, and then adding up all the points.

* M & P = Medical and Professional Staff

See Q.30, previous page, for meaning of A, B, C, etc.

=====

The most striking thing about the results of Table 14 is the high degree of agreement within a rather diverse and individualistic group of people on the reasons for the emigration we call brain drain. Reasons A, B, E and K have all got more than twice A, B and E more than thrice the score of the next most popular reason. There are very significant differences between the relative strength of these reasons in the foreign experienced and non-foreign experienced group. All the choices given were reasons which are sometimes put forth as having something to do with brain drain. From Table 14 one would conclude that reasons F, G, H and I are completely insignificant and need not be considered at all in future discussions of the subject.

C.4. Attracting 'Brains' Back to India

a) Recruiting to IITK from Abroad and from India

As pointed out in Section B, the question of whether or not brain drain is an important problem for a developing country such as India depends partly on how reversible it is. The concept of the advanced country as a storage reservoir has no validity if it is not possible to draw from the reservoir when a requirement arises.

Such a requirement was created in India when IIT Kanpur was organized in the early 1960's. Several hundred 'brains' were required, and it was necessary to recruit them from the Western countries, rather than from India alone. If the requirement had been met by recruiting within India only, substantial compromises would have been necessary in type and quality of people. Fortunately this was recognized from the start. The IITK leadership was able to institute several practices in faculty recruitment which differed from the usual pattern in the country. One of these was hiring a man directly from abroad, sight unseen. Usually a man cannot be considered for a faculty position in an Indian university unless he appears in person before the selection committee. Another was the payment of travel expenses for the man and his family to return to India. This was included as part of the offer of employment. The Institute has the American academic structure with more than one professor in each department and only a few non-Ph.D. faculty (making the faculty more a community of scholars and less a collection of little kingdoms, each with its chief), this was new to India and certainly made it easier to recruit younger men.

Other incentives assisting in recruiting the desired 'brains' from abroad were the presence of American collaboration and aid resulting in impressive amounts of sophisticated research equipment, the promise and reality of academic freedom to a greater degree than is customary in the country, promise of a liberal policy toward leaves, travel and consulting, encouragement of research, high quality of students, and moderate teaching loads. Incentives not present were special salary scales, such as have been used in Korea to attract scholars back from abroad. The salary scale at IITK is the

same as at the other IIT's and universities in India, which means that salaries are 10 to 15% of those in the United States.

The incentives have evidently been effective. A large number of talented scholars have been recruited from abroad specifically to join IITK. Just how many can be seen from Table 15.

- Q.20. a) Did you receive an offer from IITK before you returned to India?
- b) Did you accept an offer of employment at IITK before returning to India?
- c) Did you return to India specifically to take up a position at IITK?

=====

TABLE 15 : Extent of Recruiting from Abroad
 (Foreign Experienced Academics ⁽¹⁾ Only)

	Q. 20(a)		Q. 20(b)		Q. 20(c)	
	Total Acad.	Asst. Prof. and above	Total Acad.	Asst. Prof. and above	Total Acad.	Asst. Prof. and above
YES	72	68	70	66	56	51
NO	45	32	44	31	51	40
A*	18	12	18	12	18	12
NR**	2	2	5	5	12	11
Total	137	114	137	114	137	114

(1) There was also one foreign experienced non-academic recruited from abroad (medical).

* A refers to the foreign experienced faculty who received their foreign experience while on leave from IITK and had not been recruited from abroad in the beginning. For these people the question was irrelevant. However it is interesting to know their number.

** But were foreign experienced.

=====

Evidently the incentives available were sufficient to attract a number of talented persons* back to India from the Western countries, in the face of a steep salary gradient. Not all these incentives are available to other institutions within India or to other developing countries facing the same problem. Others are available to all, though they may not be used at present. For example the large scale American aid and large amount of dollar equipment would not easy to duplicate in other places. On the other hand, selection without interview doesn't cost anything, and payment of return travel costs very little. Thus it is interesting to try to find out which were the, strongest and most effective incentives operative in recruiting people (especially from abroad) to join IIT. Two questions were asked. The first (Q.23) asked for the respondent's own motivations, the second (Q.28) for his opinion about what he thought were the most effective incentives in recruiting professional people to IITK. These questions were asked of the entire sample, not just the foreign experienced part.

Q.23 : In your decision to apply for, and subsequently accept, a position at IITK, which of the following factors were most important? Give three factors and three only, indicating the most important by '1', the next most important by '2', and the third most important by '3'.

- A good general reputation and outlook of IITK
- B geographical location of IITK within India (i.e. in U.P., rather than South etc.)
- C presence of some particular research facility - e.g. computer, electron microscope, etc.
- D presence of American collaboration and aid
- E more academic freedom, flexibility, advancement opportunity in a non-traditional university

* Although a quantitative measure is not easily obtained, visiting American staff and others are generally of the opinion that quality of the IITK faculty, especially Asst. Prof. and above, is very high - comparable to that found in prestigious universities in USA and UK.

- F presence of good schools, medical facilities, housing, etc. on the campus
- G travel expenses paid for return to India
- H firm employment offer made 'in absentia' - i.e. no requirement to appear in person before the selection committee
- I feeling of 'more chance to do something at a new place'
- J presence at IITK of some particular individual or individuals with whom I wished to become associated
- K being personally asked to join by Director, Department Head, etc.
- L considering all fringe benefits, the salary or rank offered by IITK was better than competing offers
- M needed a position somewhere and did not have any other offer
- N other
(please specify)

Q.28 : In your opinion which of the following are the most important factors in recruiting professional people to IITK? List three, and only three, and indicate the order of importance by marking a '1' in the box for the most important, a '2' for the next most important, and a '3' for the least important of the three .

- A general favorable reputation, opportunity for research, etc.
- B academic freedom, flexibility, advancement opportunity, in a non-traditional university
- C encouragement of outside consulting, liberal attitude on leaves, etc.
- D presence of American collaboration and aid
- E willingness to make a firm offer to a candidate 'in absentia'
- F payment of travel expenses for return to India
- G light teaching load
- H high quality of students
- I other existing factor (specify)
list other incentives IITK could offer which you think would be comparable in significance with the three you have marked as most important

Results were as shown in Table 16 and 17.

=====

TABLE 16 : Factors In Recruiting to IIT (Question 23)

Response to Q.23	Complete Sample	Foreign Experienced		RFA*	Foreign Experienced		ACADEMIC		NON-ACADEMIC		
		YES	NO		YES	NO	Asst. Prof. and above	Total Acad.	M&P**	Admin.	Total Non-Acad.
Total No.	(225)	(141)	(84)	(76)	(137)	(64)	(124)	(201)	(13)	(11)	(24)
A	204	127	77	73	122	48	99	170	15	19	34
B	44	24	20	7	21	10	13	31	7	6	13
C	132	88	44	44	88	44	76	132			
D	62	46	16	32	44	13	40	57	4	1	5
E	241	170	71	89	170	69	149	239		2	2
F	19	8	11		8	3	5	11	2	6	8
G	33	33		31	30		27	30	3		3
H	46	44	2	44	44	2	41	46			
I	157	76	81	25	76	55	76	131	9	17	26
J	31	6	25	4	6	23	8	29	2		2
K	31	28	3	11	22	3	21	25	6		6
L	66	42	24	16	42	8	36	50	4	12	16
M	28	20	8	13	19	6	20	25	1	2	3
N***	60	16	44	5	42	5	18	47	12	1	13

Numbers given in the table (except in the first line) are scores, computed in the manner described earlier under Table 14.

* RFA = Recruited From Abroad. This is the group which answered 'yes' on 20(a), 20(b) or 20(c), one non-academic is included.

** M&P = medical and professional staff.

*** Under 'other', a total of 21 reasons were written in by various respondents.

7 of these could not be of general application ('deputed by the parent service', or 'offered a fellowship here'), or else were relevant to students (some respondents came first as students, then joined the staff later). Three more were essentially equivalent to A. Five more could apply to any institution ('wanted a change,' 'it was a permanent position', etc.) One was roughly equivalent to D.

=====

=====

TABLE 17 : Factors in Recruiting to IITK (Question 28)

Response to Q.28	Complete Sample	Foreign Experienced RFA*	ACADEMIC		NON-ACADEMIC		Total Non-Academic
			Asst. Prof. and above	Total Acad.	M&P**	Admin.	
(Total No.)	(225)	(76)	(124)	(201)	(13)	(11)	(24)
A	353	97	182	314	24	15	39
B	351	119	195	324	12	15	27
C	46	11	22	40	2	4	6
D	67	23	32	51	13	3	16
E	72	66	72	70	2		2
F	68	44	45	61	4	3	7
G	27	5	12	21	2	4	6
H	68	23	35	61	7		7
I***	18	3	5	9	3	6	9

Numbers given in the table (except for line 1) are scores, computed in the same way as described earlier under Table 14.

* RFA = Recruited From Abroad. This is the group which answered 'yes' on either 20(a), 20(b) or 20(c). One non-academic is included.

** M&P = medical and professional staff.

*** Under 'other existing factor' there were 11 different factors written in. One was negative in tone ('favoritism'), two mentioned non-academic things ('free medical facilities', 'good living conditions, better community facilities'), one could apply anywhere, but, alas, rarely does ('feeling of being wanted'), the other seven mentioned various good aspects of the academic side of the Institute (high quality colleagues, pattern of education, etc.)

=====

Considering the responses to these two questions together (Table 16 and 17) we note that, once again, there is a high degree of consensus. The favored reasons, in order of preference to the 'recruited from abroad' group would seem to be B on Q.28, A on Q.28, E on Q.23 and A on Q.23 - these being really two reasons only because B and A on Q. 28 are nearly equivalent to E or A on Q. 23. At intermediate strength are H, C, D and G in Q. 23 and E, F, H and D in Q. 28.

These correspond only partially with the factors that require substantial resources to create. One of the leading reasons (good general reputation of IITK, etc.) would perhaps be difficult for an institution to create in the absence of adequate resources, but the other (academic freedom, flexibility, advancement opportunity, etc.) depends mainly on the internal structure of the institution, the attitude and policies of its leadership etc. IITK's 'new style' in this regard could be, and hopefully will be, copied by other universities and institutions even if they do not have access to funding on the IIT scale. The two recruiting policies mentioned (selection without interview, payment of travel expenses) appear as intermediate strength factors, with selection without interview being the stronger of the two.

Recruiting is not the same as retention, and factors such as Q.23 - F, which scores very low in Table 16, may be important in keeping good people at IITK once they have been successfully recruited.

The second part of Q. 28, "List other incentives IITK could offer which you think would be comparable in significance ..." attracted 22 write-ins, which mentioned 21 different incentives. A few of these were: more advancement opportunity, more higher posts, reward for merit rather than length of time (particularly in administration), more appreciation for good work, better administrative support, better general facilities, more money, etc. Many of these would seem to be not so much incentives for recruiting new people but mainly removal of irritations and problems facing people already here.

C.4. (b) Personal Reasons why Indians Return to India

In addition to the question 'what incentives attract people to IIT Kanpur' we can ask 'what makes Indian scientists, engineers, and other professionals decide to leave the easy life in the West and return to India?' This is a more general question, less tied to IITK and the specifics of the position offered.

The following question was asked only of the foreign experienced part of the sample.

Q. 15 : At the time you decided to return to India, which of the following reasons were most important to you? MARK three reasons and three only, indicating the most important reason by '1' the next most important by '2' and the least important of the three by '3'

- A desire to be a part of Indian development, to help my country, national pride, identification with goals of Indian development
 - B could not obtain permission (i.e. proper visa) of the developed country to remain
 - C no suitable position available for me in the developed country
 - D position offered me in India was more challenging or otherwise more desirable than the position available to me in the developed country
 - E wished to return to India to live in a familiar culture - never felt 'at home' in the developed country
 - F wanted to be near my family and friends
 - G wished to return to be married
 - H a feeling that my children should grow up in India
 - I had agreed to return before going to the developed country
 - J parents, wife, or other members of my family wanted me to return
 - K family obligations required my return
 - L none of the above
- (please state reason)

and the response was as shown in Table 18.

TABLE 18. : Personal Reasons why Indians Return
(Foreign Experienced Only)

Response to Q.15	Total Foreign Experienced	Reduced Total*
(Total Number)	(141)	(117)
A	226	183
B	11	3
C		
D	26	15
E	67	57
F	92	51
G	10	10
H	25	23
I	70	27
J	45	32
K	51	41
L**	39	39

Numbers given in the table (except for line 1) are scores, computed in the manner described earlier under Table 14.

* Leaving out those who had been on leave and returned to previous employer (Q. 18)

** There were 13 other reasons given. One was a minor variation of A and one a minor variation of E. All but one of the others indicated a positive attraction to India, rather than a desire to leave the Western country. One indicated that getting a job in India was decisive. A recurring write in was 'India is my home, India is my country'.

The conclusion to be drawn from the results of Q. 15 is that those who return to India do so because they want to, not because they are forced to by lack of opportunity in the western country. Moreover the dominant reason (three times the score of the next most popular) is the nationalistic one, reason A ('to be a part of Indian development, to help my country'). It would appear that most of the sample returned to India for reasons more or less independent of the existence of IITK, though of course they had to have a place to come to.

C.4. (c) Returning Without a Position

One of the major reasons for brain drain in the first place is shortage of jobs in India. Thus an Indian returning from the West can expect to locate a suitable position only after some time. To alleviate this problem the Scientist Pool was formed some years ago by the government, and has had some success*. However recruiting directly from abroad, as done by IITK on a large scale (Table 15), is a far more effective way to get the desired professionals to return. This is clear (see the argument after the tables) from the responses to two questions, dealing with how long the respondent had to wait after returning to India before he found a permanent position, and what sort of position he took up first on return. Of course many respondents were hired while still abroad or else went abroad on leave; they did not have this problem.

Q. 18 : How long did it take to find a suitable permanent position after returning to India?

- A less than one month
- B more than one month, less than three
- C more than three months, less than six
- D more than six months, less than nine
- E more than nine months, less than one year
- F more than one year, less than two
- G more than two years
- H had a position waiting for me when I arrived. (As, for example, having accepted an offer before returning.)
- I did not have the problem of finding a position because I had been on leave, and I simply returned to my previous employer
- J was not interested in a permanent position at the time I returned (as, e.g., a student or a wife)
- K Other (explain)

* As of 1 December 1968, of almost 3500 who have been or are now in the pool, only 120 are in the 'left pool and gone abroad' category. Note also (Table 19) that 8 of the present IITK faculty first returned to India as Pool Officers.

- Q. 19 : First position you held after return to India, whether at IITK or elsewhere. (If you have returned to India more than once, consider only the most recent time, unless you were simply on leave and returned to previous employer.)
- A Senior Professor, Professor, Associate Professor, or equivalent in a university
- B Assistant Professor, Lecturer, Associate Lecturer, Post-doctoral Fellow, or equivalent in a university
- C Student
- D Pool Officer
- E Industrial Position, base salary under Rs. 600/- month
- F Industrial Position, base salary Rs. 600/- month or more
- G Government Position, base salary under Rs. 600/- month
- H Government Position, base salary Rs. 600/- month or more
- I None of the above

(Please indicate nature of position and base salary)

The responses to these two questions are shown in Table 19.

TABLE 19 : Finding a Position on Return to India
(Foreign Experienced Only)

Response to Q.18	Total Foreign Experienced	Reduced* Total	Response to Q.19	Total Foreign Experienced	Reduced** Total
A	6	6	A	5	
B	4	4	B	111	31
C	7	7	C		
D	2	2	D	9***	9
E	7	6	E		
F	2	1	F		
G	1	1	G	2	2
H	74	8	H	2	1
I	26	8	I	1	1
J			NR	11	5
K	1	1			
NR*	11	5			
Total	141	49	Total	141	49

For meaning of A,B,C, etc. see statement of Q.18 and Q.19 on preceding page.

* But were foreign experienced

** Reduced by eliminating those who were recruited from abroad to join IITK directly ('yes' on 20(a), 20(b) or 20(c)) and also those who had been on leave from IITK.

*** Of these 9 who served as Pool Officers on first returning, one is still a Pool Officer, 2 are now Professors (Science), 3 are Assistant Professors (2 Science, 1 Engineering), and 3 are Lecturers (Science).

Considering Table 19, note first of all that the response to Q. 18 shows that finding a permanent position, if one returns to India without one, is by no means quick and easy. Thus anything which makes it possible for a man to come home and take up work directly greatly increases the attractiveness of coming back. Certainly it is also to the national advantage if these people are put to work immediately upon return. Note also the responses to Q. 19 which show that, even in the reduced sample, 31 respondents took up a junior faculty or postdoctoral position as the first post upon return to India, whereas only 9 joined the Scientist Pool. Thus the Pool is serving only a fraction of the total returnees, even though it has been established for some years. Recruiting directly to academic posts without interview would appear to be a more effective way to induce scientists and engineers to return than offering them a position in the Scientist Pool, and would also seem to be more socially efficient, since most people take no post until they get one of this type anyhow. The pool is a step in the right direction but recruiting directly from abroad without interview is a bigger step .

C.5. Miscellaneous Other Information

a) Circumstances of Recruitment

One of the many differences in university operation between India and the United States is in the recruiting of academic staff. Formal advertisement of positions is not done in the U.S., whereas in India it is a legal requirement. Also, writing to Director or Department Head to make one's interest and availability known, rarely results in a position in an American university (though many letters are received); it works more often in India. The American practice stresses recruiting, the Indian style is more one of taking applications. Since IIT Kanpur has had a stronger dose of American influence than any other Indian university, it is interesting to see to what extent American faculty recruiting practices have 'rubbed off'. It turned out that this question was one of the few where several important response choices were left out, nevertheless the results are still interesting. They show a pattern that is very strongly Indian, in spite of so many of the staff having been recruited from USA.

The question was phrased:

Q. 24 : What were the circumstances of recruitment in your case - i.e., how did you first come in contact with the Institute? (Check one only)

- A answered advertisement
- B knew of IITK and wrote to Director or Department Head
- C IITK was recommended to me by thesis professor or other advisor
- D urged to apply by someone who was here, or who had been here
- E other

(please specify)

And the results were :

=====

TABLE 20 : Circumstances of Recruitment

Response to Q.24	Total Sample	Foreign Experience		ACADEMIC STAFF		Total Non- Academic
		YES	NO	Asst. Prof. and above	Total Academic	
A	85	43	42	34	70	15
B	58	45	13	43	58	
C	18	11	7	10	18	
D	21	15	6	14	18	3
E*	6	2	4	3	3	3
F*	15	11	4	6	12	3
NR	22	14	8	14	22	
Total	225	141	84	124	201	24

For meaning of A, B, C, D see statement of Q.24 on preceding page

* E = Asked to join by Director

* F = All other write in responses

* - Designates write-in response

C.5. b) Future Plans

Two questions were asked about future plans, in an attempt to get some idea of the stability of the group at IITK, and of major present sources of discontent. Also, from the brain drain view point, how much do the faculty and staff consider themselves part of an international community and how much do they consider themselves Indians first and scientists second? When disenchanted at IITK do they think in terms of leaving India, or of looking for another position within India?

Q. 25 : Looking ahead for 5-10 years, what are your future plans?

A plan to stay with IITK for the next 5-10 years, perhaps longer (being on leave is 'with IITK' if the intention is to return to IITK at the conclusion of the leave).

B plan to stay in India for the next 5-10 years or longer, but not necessarily at IITK

C intend to leave India during the next 5-10 years with a possibility of not returning

D undecided among the above

E other (comment)

The responses were as shown in Table 21.

TABLE 21 : Future Plans

Response to Q.25	Total Sample	Foreign Experience		ACADEMIC		NON-ACADEMIC		
		YES	NO	Asst. Prof. and above	Total Acad.	M & P*	Admin.	Total Non-Academic
A	70	45	25	43	64	2	4	6
B	36	27	9	20	35	1		1
C	12	7	5	5	11	2		2
D	56	39	17	35	49	4	3	7
E**	10	3	7	2	8	1		1
F**	19	7	12	6	13	3	3	6
NR	22	13	9	13	21		1	1
Total	225	141	84	124	201	13	11	24

* M & P = Medical and Professional Staff

** E = "intend to go abroad and then return to India". This is a write-in response.

** F = all other write-in responses

It seems clear from Table 21 that respondents regard themselves as permanently likely to remain in India and not as only provisionally returned. Again, this supports the view that brain drain is not a serious problem. Those who have worked both in the West and in India at IITK expect, by a margin of 3 to 1 or 4 to 1, that if they leave IITK their next position will be in India.

From the point of view of IITK, it is heartening to see that such a large majority expect to remain here for the indefinite future, in spite of the fact that the promotion outlook for the lower academic ranks is not too encouraging at present, at least compared to a few years ago.

On the other question respondents were asked to suppose that they would in future leave IITK - even if in fact they do not now intend to - and to name the reasons which they would be responding to in leaving.

To some extent this is a way of probing present discontents, without being too explicit. A number of explicit statements of present discontent were written in, however.

- Q. 26 : Suppose -hypothetically- you were to leave IITK within the next five years and take up a post elsewhere, either in India or abroad. What would probably be the most important reasons? List three, and only three, and indicate the order of importance by marking a '1' in the box for the most important, a '2' for the next most important and a '3' for the least important of the three.
- A Better income and standard of living
- B Better opportunity to practice my profession, carry out meaningful research, to take my place in the profession worldwide
- C Moral, social, political decay in India made me decay I wanted to get out
- D Originally I returned to India because of personal or family reasons, and these no longer seemed so important, so I decided to go back to the developed country
- E Was happy enough at IITK, but received an offer from somewhere else that was too good to turn down
- F Originally took the position at IITK as an intermediate measure, until a better opportunity or more suitable post became available, so when it did I left
- G IITK was not developing the way I had thought it was going to at the time I joined
- H Friction or divergence of objectives with colleagues, Department Head, Dean, Director, etc.
- I Further advancement at IITK appeared blocked
- J Other
- (describe)

=====

TABLE 22 : Reasons for Leaving

Response to Q.26	Total Sample	ACADEMIC		Total Non-Academic
		Asst. Prof. and above	Total Academic	
(Total Number)	(225)	(124)	(201)	(24)
A	202	83	166	36
B	340	208	321	19
C	36	23	36	
D	17	12	15	2
E	128	80	114	14
F	20	1	16	4
G	149	102	141	8
H	30	17	29	1
I	150	58	123	27
J (other)	68	38	56	12

=====

Numbers given in this table (except for the first line) are scores, computed as explained in the footnote to Table 14.

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C.5. c) Personal Background of Respondents - Family, Region, Caste, Religion

This information may have some relevance to brain drain, but I am including it here mostly because it is interesting in its own right. The correlation of the brain drain question responses with the personal background of individual respondents has not yet been carried out.

Two questions relate the present situation of the respondent with that of his parents. Respondent was asked to give vocation of father and also the highest educational level reached by either parent.

Q.5(a) During a majority of the first twenty years of your life, what was your father's business or profession?

Since this was a write-in question, some judgement had to be used in classifying the responses. One man might say 'government service', while another would say 'clerk' for the same job. However it was possible to sort the answers out with reasonably good reliability, and the results are shown in Table 23.

TABLE 23 : Father's Business or Profession

	Total Sample	Foreign Experience		Asst. Prof. and above	ACADEMIC	
		YES	NO		Total Academic	Total Non-Academic
Agriculture ⁽¹⁾	22	12	10	10	20	2
Business ⁽²⁾	31	21	10	18	30	1
Law	22	14	8	10	20	2
Medicine	9	6	3	04	09	0
Teaching ⁽³⁾	29	20	9	16	27	2
Engineering	16	11	5	11	13	3
Science	2	2	0	1	1	1
Landlord ⁽⁴⁾	8	4	4	4	6	2
A & T ⁽⁵⁾	3	2	1	2	3	0
Govt Service ⁽⁶⁾ (Officer)	10	8	2	7	7	3
Govt. Service ⁽⁶⁾ (Other)	28	14	14	10	23	5
Office Worker	13	7	6	8	11	2
Misc. Other and unclear	5	2	3	3	4	1
NR	27	19	8	20	27	0
Total ⁽⁷⁾	225	142	83	124	201	24

Note: In case of conflict or overlap between categories the respondent has been placed in the category which appears higher on the list. Thus "agriculture - teaching" is attributed to agriculture, "engineer in government service" is attributed to engineering; "clerk in government service" is attributed to government service.

(1) Includes 'cultivation', 'horticulture', etc. but not 'landowner'.

(2) Includes 'merchant', 'trader', 'officer in firm', 'manufacturer'.

(3) At all levels. Of the total shown, 3 were professors.

(4) Includes 'landowner' and 'Zamindar'

(5) A & T = artisan and technician

(6) Includes state and local government and railways.

(7) Because of a minor tabulation error the second and third totals in this row are not 141 and 84, as they should be.

- Q..5. (d) Did either parent have (check only the highest)
- A Ph.D., D.Sc., Sc.D., M.D., or equivalent
 - B M. Tech., M.B.B.S., M.A., M.S., or equivalent
 - C B. Tech., B.E., or equivalent
 - D B.S. or equivalent
 - E Higher secondary, senior Cambridge, matriculate or equivalent
 - F 7 years or more of formal education
 - G less than 7 years of formal education

These alternatives seemed to cover all possibilities; there were no write-ins. It would have been interesting to ask whether either parent had studied or worked in a developed country, but this was not thought of until too late.

The response to Q. 5(d) is shown in Table 24.

=====

TABLE 24 : Parent's Education

Responses to Q.5(d)	Total Sample	Foreign Experienced		ACADEMIC		
				Asst. Prof. and above	Total Academic	Total Non-Academic
		YES	NO			
A	11	11		10	10	1
B	38	24	14	16	36	2
C	21	15	6	14	16	5
D	50	32	18	26	44	6
E	43	23	20	22	36	7
F	23	12	11	11	20	3
G	17	10	7	10	17	
NR	22	14	8	15	22	
Total	225	141	84	124	201	24

For meaning of A, B, C etc. see statement of Q. 5(d)

=====

There are many interesting facts hidden in Tables 23 and 24; most are left for the reader to discover. There is data for an analysis of social mobility of the sample population, which might extend the study by Rajagopalan and Singh (ref.5).

Next to immediate family some of the strong factors influencing an individual's personality; character and future life are caste and sub-caste, religion, region, and type of residential community (rural or urban, etc.). The first two cannot be covered very well in a questionnaire. Even to classify an all-India sample by caste requires an expert. Consequently, what was done was to ask for only the most general sort of classification.

The questions were

4. a) Broadly speaking, do you consider yourself to be

- | | | | |
|--------------------------|---------------|--------------------------|------------------------------|
| <input type="checkbox"/> | <u>Hindu</u> | <input type="checkbox"/> | <u>Christian</u> |
| <input type="checkbox"/> | <u>Sikh</u> | <input type="checkbox"/> | <u>Parsee</u> |
| <input type="checkbox"/> | <u>Muslim</u> | <input type="checkbox"/> | <u>Other (specify)</u> _____ |

Would you indicate your general caste background as

- | | |
|--------------------------|---|
| <input type="checkbox"/> | <u>Brahman</u> |
| <input type="checkbox"/> | <u>Non-brahman/enter exact name if you wish</u> _____ |
| <input type="checkbox"/> | <u>Trading Castes</u> |
| <input type="checkbox"/> | <u>Agricultural Castes</u> |
| <input type="checkbox"/> | <u>Artisan Castes</u> |
| <input type="checkbox"/> | <u>Scheduled Castes/tribes</u> |
| <input type="checkbox"/> | <u>None of the above</u> |
| <input type="checkbox"/> | <u>Caste not a relevant descriptor in my case</u> |

The results, classified by general field, are given in Table 25. The tabulation by religion shows 85% of the responding group checking 'Hindu', with

the remainder more or less evenly distributed over, Sikh, Muslim, Christian, Jain, agnostic/athiest, general/humanist, and refuse to answer. The non-respondents are approximately equal in number to all the non-Hindu responses put together, which effectively prevents any valid analysis of the religion responses. The tabulation by caste has, however, some interesting features. The most emphatic thing is the number who regard caste as not relevant to a description of themselves. Fifty seven respondents checked this box, over 25% of all those answering the question. In verbal and written comments the view was repeatedly expressed that caste went with the old India and they were part of the new India. On the other hand, not every one feels that way, since 33 respondents wrote in exact caste name which was clearly stated to be optional. The names written in, surprisingly, were very few in number, Vaish, Kayastha and Kshatriya alone accounting for all but 5 of the 33 responses.

The number of non-brahmans was exactly equal to the number of brahmans. There were no responses for Scheduled Castes/Scheduled Tribes and only one for artisan castes.

TABLE 25 : Caste and Religion

Religion	Total Sample	GENERAL FIELD					Caste	Total Sample	GENERAL FIELD				
		<u>E</u>	<u>S</u>	<u>H</u>	<u>T</u>	<u>A</u>			<u>E</u>	<u>S</u>	<u>H</u>	<u>T</u>	<u>A</u>
Hindu	176	89	55	12	14	6	Brahman(B)	77	45	20	4	7	1
Sikh	2	2					Non-Brahman (NB)	77	35	27	6	6	3
Muslim	5	2	1	1	1		Trading	9	2	5	2		
Christian	5	1	2	1		1	Agricultural	8	5	3			
Parsee							Artisan	1	1				
Other							Scheduled						
*Jain	3	2			1		None of the above	13	8	4			1
*A(1)	5	1	3	1			Caste Not Relevant (CNR)	44	18	15	6	3	2
*G(2)	4	1	2	1			B + CNR	5	4	1			
*R(4)	2	1	1				NB + CNR	8	2	4	2		
NR	23	10	9	4			ENG ⁽³⁾	33	14	11	1	4	3
Total	225	109	73	20	16	7	*R ⁽⁴⁾	4	1	2			1
							NR	23	10	9	4		
							Total ⁽⁵⁾	225	109	73	20	16	7

For meaning of E, S, H, T, A see Table 1

* All responses so marked are write-in responses. Thus the numbers given for them would probably be an underestimate in some cases.

(1) A = 'Agnostic'/'athiest'/'non-religious person'/'no religion'

(2) G = 'General'/'Indian'/'Humanist'

(3) ENG = Exact Name Given. Names given, and the frequency of each, were: Vaish (6) Kayastha (12), Rajput, (3), Kshatriya (10), Lingayat (1), Sheikh (Muslim) (1).

(4) R = Refuse to answer

(5) of 1st, 2nd, 8th, 12th and 13th rows

In regard to rural/urban background, it might be expected that a sample of intellectuals such as this would come predominately from sophisticated city environments, but such does not seem to be the case. Although the proportion of our sample coming from urban backgrounds is certainly greater than for the national population as a whole, it is not dominant, and quite a number come from towns and villages. The question was

Q.5(c). During a majority of the first twenty years of your life, did you live in a

- A city with population exceeding 10 lakhs (one million)
- B city with population 1-10 lakhs
- C town with population 0.1-1.0 lakh
- D small town, village or hamlet with population under 10,000

TABLE 26 : Urban/Rural Background

Rural/Urban	Total Sample	Foreign Experience		ACADEMIC		NON-ACADEMIC		
		YES	NO	Asst. Prof. and above	Total Acad.	M & P ⁽¹⁾	Admin.	Total Non-Acad.
Big city*	54	40	14	35	46	5	3	8
City	58	32	26	30	50	5	3	8
Town	48	36	12	28	44	2	2	4
Village	27	14	13	12	26		1	1
D & M**	15	5	10	5	13	1	1	2
NR	23	14	9	14	22		1	1
Total	225	141	84	124	201	13	11	24

Big city = population more than one million

City = population 0.1-1.0 million

Town = population 10,000-100,000

Village = population under 10,000

* As of 1961 census the cities of India with population exceeding one million were: Calcutta, Bombay, Madras, Delhi, Hyderabad, Ahmedabad and Bangalore. Kanpur at 971,000 did not make the list. Consideration was given to correcting all the 'big city' responses from U.P. into 'city', but it was decided not to do this. For one thing, some of the respondents may have lived in the U.P. suburbs of Delhi. For another, the gap between Kanpur and the next city below in the census (Poona at 737,000) is quite large. So the definition of 'big city' was shifted downward 3% to include Kanpur.

** D&M = Double and multiple checks which could not be corrected.

(1) M&P = Medical and Professional Staff

The origin of the sample by state within India is of interest, and is shown in Table 27. The question was asked in the form

Q.5(b) During a majority of the first twenty years of your life, did you live in what is now

A Andhra Pradesh

B Assam

C Bengal

(etc., for over 20 alternative choices.)

The response showed representation at IIT from every state in the country except Assam, and from Burma and both wings of Pakistan. U.P. responses dominated, both in total sample and in higher academic posts. When considering Table 27, it should be kept in mind that (1) 10% of the sample is hidden in the non-respondent's category, and about 8% more in double and multiple checks (if a respondent checked both Bengal and Bihar it was not feasible to tabulate $\frac{1}{2}$ to each); (2) The statement of the question is not the same as the 'To which state do you belong' question usually encountered on GOI application forms.

Chander (ref.6), considering internal (within India) movements only, has pointed out that there is considerably more outflow of scientific and technologically skilled manpower from the Southern Zone (Tamilnadu, Kerala, Mysore and Andhra Pradesh) than inflow to it. Apparently IITK has been the beneficiary of some of this outflow.

TABLE 27 : STATE OF ORIGIN*

Response to Q. 5(b)	Total Sample	ACADEMIC		NON-ACADEMIC		Total Non-Acad.
		Asstt. Prof. and above	Total Acad.	M & P ⁽¹⁾	Admin.	
Andhra Pradesh	23	16	22	1		1
Assam						
Bengal	9	7	8	1		1
Bihar	9	6	9			
Delhi State	9	4	7	1	1	2
Jammu/Kashmir	2		2			
Goa	1	1	1			
Gujarat	3	2	3			
Harayana	1	1	1			
Himachal Pradesh	1	1	1			
Kerala	3	2	3			
Madhya Pradesh	6	1	6			
Maharashtra	14	8	11	3		3
Mysore	23	19	23			
Orissa	5	2	5			
Punjab	5	2	4	1		1
Rajasthan	1	1	1			
Tamilnadu	8	6	8			
Uttar Pradesh	59	24	48	4	7	11
E. Pakistan	1	1	1			
W. Pakistan	1				1	1
Burma	1	1	1			
D & M**	17	6	14	2	1	3
NR	23	13	22		1	1
TOTAL	225	124	201	13	11	24

* Note that the question asked was not the only possible one. The question used on the government employment forms is "To which state do you belong"? This is not equivalent to Q. 5(b).

** Double and multiple checks

(1) M & P = medical and professional staff

D. SUMMARY AND CONCLUSIONS

A questionnaire study of opinions and background of faculty and senior non-academic staff at IIT Kanpur has been carried out. The study was successful, in a technical sense, with good response to the questionnaire (92% return) and good discrimination between alternatives on multiple answer questions. Whether the results obtained are useful, significant, worthwhile or interesting is for the reader to judge.

The principal focus of the study was brain drain - the outward migration of skilled and talented professionals from India, a less developed country, to the more developed western countries, particularly the United States. The questions investigated were: (1) Is this migration a bad thing for the less developed country?; (2) What are the causes of the brain drain migration?; (3) What are the reasons why skilled professionals return to India after they have been living in the developed country and enjoying a higher standard of living?; (4) What were the incentives which were effective in recruiting members of the sample to join IITK specifically?; and (5) What are the characteristics of the sample as regards personal background, foreign experience, etc.

The results of the study are contained in 27 tables which, together with some introductory and background material, and comments interleaved between the tables, make up this report. The conclusions which can be drawn from these tables are many; not all are of equal certainty. The following appear to be true to a very high degree of certainty.

1. An overwhelming plurality of the sample feel that brain drain is not a serious problem for India, that it will take care of itself if progress is made on development generally, and that it is useless to attack it as a separate, special, problem. Quite a number of the respondents go further and regard it as either no problem at all or as an asset.

2. The major causes of the brain drain migration, as seen by the respondents, are (1) lack of suitable jobs in India, (2) opportunity to earn high salary in the developed country, and better standard of living in the developed country, and (3) better opportunity for using professional skill in the developed country.

3. The most important reasons why Indians return to India from the developed countries, according to respondents who have themselves done it, are (1) desire to be a part of Indian development, national pride, etc.; and, (2) various family reasons or personal preferences such as a desire to live in a familiar culture. Taken all together these family reasons and personal preferences seem about equal in strength to the nationalistic reason.

4. The incentives which are effective in recruiting to IITK are many, but the two most important are : (1) general favorable reputation, opportunity for research, etc; and, (2) academic freedom, flexibility, advancement opportunity, in a non-traditional university. Of lower strength than these, but still strong, were (3) some particular research facility (such as computer, for example); (4) willingness to make a firm offer to a candidate outside India - to recruit directly from abroad, without interview, and, (5) payment of travel expenses for return to India.

5. Some of the interesting characteristics of the sample are : (1) large amount of foreign training and experience, especially from USA. For example, 92% of the faculty at the rank of Assistant Professor and above have had foreign experience of one year or more (usually much more) of the developed countries; (2) all-India origin. There are respondents in the sample from every state except Assam, from both wings of Pakistan, and from Burma; (3) about half the foreign experienced faculty have been recruited directly from abroad, without interview.

E. ACKNOWLEDGEMENTS

This study contains the effort and cooperation of a great many people besides myself. My greatest debt of course is to the respondents, the faculty and senior staff of IIT Kanpur. The survey questionnaire came at a difficult time, near the end of a semester, but 92% filled it out and returned it, even though they may not personally have been too excited about the subject. I am particularly grateful to the seven faculty members who assisted me by pretesting the questionnaire.

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2. A Summary of the findings of this subcommittee (Reuss subcommittee) is given in Chemical and Engineering News, April 8, 1968, p.22. For data on which the findings are based see ref. 17.
3. V.M. Dandekar "Brain Drain: The Indian Situation; a comment", Economic and Political Weekly, 2 1573 (1967); J. Mahanty; *ibid* 3 615 (1968).
4. John Useem and Ruth Hill Useem, "Western Educated Man in India; A Study of His Social Roles and Influence", Dryden Press, New York, 1955; 228 p. Now out of print (and also out of copyright).
5. C. Rajagopalan and J. Singh "The Indian Institutes of Technology; Do they contribute to Social Mobility?" Economic and Political Weekly 3, No.14, 565 (1968).
6. R. Chander "Pattern of Internal Migration of Scientific & Technical Manpower in India" Manpower Journal 4 April-June (1968) p.111. Study is based on data from 1961 census.

b) General References

Note: References to newspaper articles are not included here. This is not because newspaper articles have nothing to say, but because they are hard to find in libraries after some time has passed. References 7-9 were selected from the bibliography in ref. 1.

7. S.P. Awasthi., "An experiment in voluntary repatriation of high-level technical manpower - The Scientists Pool," Economic Weekly (Bombay) 17 (No.38): 1447-1452, 1965; cited in Development Digest, 4 (No.1): 28-35, 1966, National Planning Association, Washington, D.C.

Excerpts from Awasthi's report giving background of Scientist Pool instituted by Indian government, describing the mechanics of its operation, selection, placement, salaries, etc. of Pool Officers and evaluating the success of the Pool during its relatively brief existence.

8. H.G. Grubel., "The Brain Drain: a U.S. dilemma," Science 154:1420-1424, 1966; see also discussion, ibid. 155:513 ff, 1967.

Discusses brain-drain problem from the viewpoint of an economist as flow of resources. Although he acknowledges the primary responsibility of the home country to encourage return, he emphasizes alternatives available to U.S. to contribute to the resolution of the problem. Well thought out thesis but any discussion that sees the brain drain problem as largely an economic one is bound to be limited.

9. W.F. Mondale, "Program designed to assist developing countries relating to professional persons and skilled specialists", Congressional Record, 112 (No. 176), 89th Congress, Washington, D.C. 13 October 1966.

Discusses brain-drain problems as deterrent to U.S. avowed policy of aid to developing countries. States main burden is on developing countries, fundamentally in solving problem of manpower utilization, providing job opportunities, better facilities, and recognition for the efforts. Proposes bill to Congress to attack brain drain on three fronts available to U.S.: education of foreign students, development assistance, and immigration laws. A dozen relevant newspaper excerpts and letters are appended. (Background discussion is presented in an earlier issue, No. 146, of the same volume, dated 31 August 1966).

10. K. Ray, 'Scientific and Technical Personnel', (Census Monograph No.1), available from the Manager of Publications, Patiala House, New Delhi (Rs.1.50), undated (prepared 1968 or 1969). Also K. Ray, CSIR, Rafi Marg, New Delhi, pamphlet describing National Register of Scientific and Technical Personnel.

Gives a summary of the operation of the Scientists Pool and the position as of 1 December 1968. Also, gives some data on annual output and existing stock of scientific and technical personnel, and a tabulation of Indian

students abroad in various countries (in 1966-67, 6000 scientific/technical students in USA, 4000 in UK, 1200 in Germany, 400 in Canada, 500 other).

11. "The Brain Drain" Science Today Vol. 3, No. 7 & 8 (March and April) 1969 (publisher, Times of India Press, Bombay).

This is a well-written and coherent descriptive discussion based on UN studies. The situation is reviewed in its full complexity and no particular viewpoint is promoted. Data are given for numbers of migrants, costs of education and other aspects. Cost of an Indian B.Tech. education (shared by parent and government) is estimated at Rs. 19,000. Discusses measures employed at present by various developing countries in order to induce or compel foreign students to return.

12. S.P. Awasthi "Migration of Indian Engineers, Scientists & Physicians to the United States" IAMR Report No.2/1968, Institute of Applied Manpower Research, Indraprastha Estate, Ring Road, New Delhi - March 1968. Rs.7.00 or \$2.50.

86 pages consisting mostly of tables based on statistics collected by U.S. Immigration Office. Considerable discussion of the effect of U.S. Immigration Law, which has recently been liberalised, resulting in greatly increased immigration of the brain drain type. A sound exposition of the quantitative side of the picture.

13. A. Ahmad & S.P. Gupta "Opinion Survey of Scientists & Technologists" Survey Report No.9, Research Survey & Planning Organization Council of Scientific & Industrial Research, Rafi Marg, New Delhi March 1967.

Based on a questionnaire study made in 1964. Sample was large (9000) but response was low (25%) and sample was not carefully selected. Subjects studied were living and working conditions of scientists/technologists in India, attitudes toward their work and toward those around them, dissatisfactions, etc. The principal value is in the information provided about salaries, housing, family size, educational background, etc. Questions similar to our No.22 and No.30 were asked.

14. R.P. Sinha "The Economics of Brain Drain" Manpower Journal (published by Institute of Applied Manpower Research, Indraprastha Estate, New Delhi). 4 No.1 April-June 1968: p.54.
Author attempts an economic theory analysis to examine the claim that brain drain is a bad thing for a country like India. He comes to the conclusion that it is not. The use of rigorous economic theory is minimal; the argument hinges mostly on available empirical evidence. One gets the impression that some of the complications have been left out to make the model soluble.
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21. S.P. Awasthi, "Manpower Aspects of American Immigration Laws" Manpower Journal, 3, No.3, October - December 1967.
22. N.D. Aitken "The International Flow of Human Capital: Comment" American Economic Review 58 539 (1968). This is a critical analysis of ref. 23.
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24. B. Thomas "The International Circulation of Human Capital" Minerva 5 479-506 (1967).
25. W.A. Copeland "The Pahlevi - Pennsylvania Contract" International Devel. Rev. 10 No.3, September 1968, p.21 describes the development of a 'Center of Excellence' university in Iran in partnership with an American university but without USAID funds.
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28. "The International Migration of Talent and Skills" - Proceedings of a workshop and Conference, held 14-15 June 1966. Document is available from Council on International Educational and Cultural Affairs, U.S. Dept. of State, CU/PRS, Washington, D.C. 20520.