

Information and Communication Behaviour of Women Space Technologists

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Abstract

The author has carried out a survey to inquire into the information and communication behaviour of men and women space technologists in India. Members of a population of about 800, of whom about 70 were women, were questioned about their information seeking and transmission activities. The survey showed that on almost all aspects, including time spent on collecting information, number of contacts outside the organization, consultations with library staff, dependence on informal sources of information and so on, there were not significant differences between the sexes. The only important differences were that women used formal sources such as library documentation and consulted internal sources of information more than did men, and were much less likely to be gatekeepers. But women space technologists appeared to have low information potential in the sociometric analysis of informal contacts of the respondents as they were less likely to be chosen for discussion, advice and information by respondents than were men space technologists.

INTRODUCTION

Research findings in mass communication suggest that ' . . . there are consistent differences between men and women in their information processing habits. Women seem to ingest, store and reproduce information with less distortion than do men' (Bauer, 1973). Taking only information related to science and technology into consideration one may hypothesise that women scientists, engineers and technicians are more information conscious and more active in seeking information than men.

As part of a larger and comprehensive information behaviour study of Indian space

technologists (scientists, engineers, managers, technocrats and technicians of ISRO Satellite Centre, Bangalore) the data about sex of the respondents were also collected. The survey covered a population of about 800 persons through the questionnaire as well as a semi-controlled library use study. The response rate for a questionnaire was 68%. This paper reports the statistical analysis and gives an interpretation of selected aspects of information behaviour in relation to the sex of the respondents. To analyse the differences between men and women the nonparametric chi-squared test has been employed on contingency tables. The results of the test are accepted at 95% statistical significance level.

HYPOTHESES:

Both Shuchman (1980, 1981) and Raitt (1984) have referred to engineering in general and aerospace in particular as a man's world. Shuchman has further indicated that women engineers are at a disadvantage in the world of engineering in which information transfer is predominantly informal.

Though the first woman cosmonaut from USSR, Valentina Tereschkova, went into space as early as June 1963, women astronauts from America faced a high discrimination in the late 1950s and 1960s. Sheffield (1984) claimed that 'in addition to a handful of astronauts, women now work at all technical and most managerial levels in aerospace, government, and industry, but space, and particularly the aerospace industry is one of the toughest fields for women to seek success in, probably because of its traditional ties to the strongly male-dominated military programs'.

Neither Shuchman nor Raitt has compared the proportion of women in aerospace

engineering with other R&D employment patterns in their countries. Nor has Shuchman explained how women are at a disadvantage in using informal communication sources. His data did not directly support his conclusion that the largest group potentially affected in using informal information networks is women, because engineering has been a predominantly male profession as women make up only about 3% of the engineering in industry (Shuchman, 1980, 1981). The covert assumption appears to be that women hesitate to communicate with and receive communication from men and hence they form a very minor or insignificantly limited network of informal communication among themselves. This assumption appears to be a potential hypothesis for testing.

Background data of the study

Compared to 6% females in the overall employment pattern of R&D institutions in India (India, Dept. of Science & Technology, 1982), the population of space technologists in this study contained 7.6% females. Hence there was no discrimination in female employment patterns in space technology compared to other R&D employment in the country.

Almost all women in the population of the present study were placed in the middle level of the organisational hierarchy. The response of females to the questionnaire was slightly lower (56.9%) than that of males (68.5%).

Professional activities and achievements

The professional activities and achievements index developed for the response population of the study took into account, for each respondent, the number of lectures delivered, number of seminars, symposia and conferences attended and number of internal documents/reports prepared in a year, average number of papers published per year of experience, average number of patents obtained and awards and citations received per year of experience (the latter two with a weighting of 5), the number of professional

associations, societies, boards of studies, editorial committees on which they served or were members, the number of professional journals personally subscribed to, the number of tours to other centres of ISRO and organisations in a year, membership of committees, in-service training, and number of part-time studies undertaken in the last two years. The men and women respondents scored average professional activities and achievement index values of 9.20 and 6.22 respectively.

Time spent in information gathering

The survey revealed that women did not differ significantly from men in the amount of time spent on information gathering activities. Men and women respondents respectively spend an average of 9.2 and 9.5 hours per week in information gathering. (Table 1). Nor were women space technologists significantly different from men in the percentage of time spent on formal and informal sources of information (Table 2).

Relative dependence on formal and informal sources of information

Even in the relative dependence on formal and informal sources of information, women were identical with men respondents (Table 3).

Informal communication/sources of information

It would be expected from Shuchman's argument that women space technologists would depend less on informal and interpersonal sources of information, would contact fewer persons for information than do men, consult fewer experts in the field, colleagues and fellow professionals and library staff, delegate information-gathering work much less than would men. It was surprising that women did not differ from men in any of these aspects.

As could be seen from Table 4 women respondents depended almost to the same extent on informal, intrapersonal and interpersonal sources of information as men. The

Table 1 Time spent on information gathering activities

	Men		Women		Total
	No.	%	No.	%	
A More than 20 hours per week	15	3.2	1	3.1	16
B 16 to 20 hours per week	24	5.1	1	3.1	25
C 11 to 15 hours per week	105	22.4	8	25.0	113
D 7 to 10 hours per week	183	39.1	15	46.9	198
E 4 to 6 hours per week	88	18.8	6	18.8	94
F Less than 4 hours per week	53	11.3	1	3.1	54
Total	468	99.9	32	100.0	500

($\chi^2 = 2.65$, $df = 5$, $p > 0.05$)

Table 2 Relative time spent on formal and informal sources of information

	Men		Women		Total
	No.	%	No.	%	
More time on formal than informal sources of information	228	85.4	22	95.7	250
More time on informal than formal sources of information	39	14.6	1	4.3	40
Total	267	100.0	23	100.0	290

($\chi^2 = 1.87$, $df = 1$, $p > 0.05$)

Note: Those who claimed to have spent equal time on formal and informal sources of information are not shown.

Table 3 Relative dependence on formal and informal sources of information

	Men		Women		Total
	No.	%	No.	%	
A Almost entirely on informal sources	78	17.8	3	9.7	81
B More on informal sources than formal sources	43	9.8	1	3.2	44
C Equally on both informal and formal sources	192	43.7	19	61.3	211
D More on formal sources than informal sources	105	23.9		25.8	113
E Almost entirely on formal sources	21	4.8	0	0.0	21
Total	439	100.0	31	100.0	470

($\chi^2 = 5.95$, $df = 4$, $p > 0.05$)

table presents weighted mean from responses recorded on a five-point scale from 0 to 4 (0-No dependence; 1-Rare dependence; 2-Occasional dependence; 3-Frequent dependence; 4-High dependence).

The number of persons contacted for information within the organisation as well as outside the organisation (ISRO) did not vary significantly between men and women (Tables 5 and 6). By decreasing the statistical

Table 4 Dependence on informal, intrapersonal and interpersonal sources of information

Informal, intrapersonal and interpersonal sources of information	Weighted mean on a five point scale		
	Men	Women	Total
A Personal experience	3.06	3.18	3.07
B Superiors	2.31	2.70	2.34
C Peers and colleagues (in ISRO)	2.11	2.27	2.12
D Subordinates and juniors	1.74	1.80	1.74
E Fellow professionals outside ISRO	1.19	1.26	1.19
F Results of one's own experiments	2.54	2.74	2.55
G Professional meetings, seminars, symposia and lectures	1.71	1.58	1.70
H Educational and training courses	1.68	2.16	1.72

Note: The chi-square nonparametric test was carried out on each of the sources with respect to five points on the scale. The differences between men and women were not significant for any source of information.

significance level to 0.10 (from 0.05) one can see that the difference in number of persons contacted outside the organisation varied from men to women. Women tended to have fewer contacts outside the organisation than men, an expected natural result (Table 6).

Sources of bibliographic information and degree of delegation of information gathering work

Consulting experts in the field, colleagues and fellow professionals and library staff for bibliographic references (Tables 7, 8 and 9) did not significantly differ between men and women. However, women seem to consult experts slightly more than men, which is quite opposite to expectations (significance level 0.10).

The degree of delegation of information gathering work did not differ significantly between men and women (Table 10).

Information value

In the survey respondents had been asked to cite names of five persons most often contacted for information. By sociometric analysis, it was found that 423 (unique) individuals within the population have been mentioned in all 1263 times by 391 respondents. In other words, on average, a person cited has been a source of information to about 3 respondents.

By assuming that a communication star is one who is contacted as an informal source of information by more than one standard deviation over and above the mean number of contacts by respondents, (i.e. $2.99 + 3.03$

Table 5 Number of interpersonal contacts within the organisation

Number of persons contacted	Men		Women		Total
	No.	%	No.	%	
None	4	1.1	0	0.0	4
1 to 5	141	37.8	11	37.9	152
6 to 10	120	32.2	11	37.9	131
11 or more	108	29.0	7	24.1	115
Total	373	100.1	29	99.9	402

($\chi^2=0.8$, $df=3$, $p > 0.05$)

Table 6 Number of interpersonal contacts outside the organisation

Number of persons contacted	Men		Women		Total
	No.	%	No.	%	
None	83	27.5	5	23.8	88
1 to 5	133	44.0	14	66.7	147
6 or more	86	28.5	2	9.5	88
Total	302	100.0	21	100.0	323

($\chi^2=4.89$, $df=2$, 0.10 , $p > 0.05$)

Table 7 Consulting experts in the field for bibliographic references

	Men		Women		Total
	No.	%	No.	%	
Consulted	237	50.6	22	66.7	259
Not consulted	231	49.4	11	33.3	242
Total	468	100.0	33	100.0	501

($\chi^2=2.2$, $df=1$, $p > 0.05$)

Table 8 Consulting colleagues and fellow professionals for bibliographic references

	Men		Women		Total
	No.	%	No.	%	
Consulted	310	66.2	26	78.8	336
Not consulted	158	33.8	7	21.2	165
Total	468	100.0	33	100.0	501

($\chi^2=2.2$, $df=1$, $p > 0.05$)

Table 9 Consulting library staff for bibliographic references

	Men		Women		Total
	No.	%	No.	%	
Consulted	193	41.2	16	48.5	209
Not consulted	275	58.8	17	51.5	292
Total	468	100.0	33	100.0	501

($\chi^2=0.67$, $df=1$, $p > 0.05$)

Table 10 Degree of delegation of information gathering work

Degree of delegation	Men		Women		Total
	No.	%	No.	%	
A No delegation	233	53.4	14	46.7	247
B Occasional delegation	87	20.0	8	26.7	95
C Moderate delegation	90	20.6	7	23.3	97
D Frequent delegation	26	6.0	1	3.3	27
Total	436	100.0	30	100.0	466

($\chi^2=1.3$, $df=3$, $p > 0.05$)

= 6.02), 44 communication stars who were frequently contacted by 7 or more respondents were identified. Of these only one female frequently contacted by seven respondents qualified to be a communication star. The rest of the women technologists were not communication stars. In fact, one was contacted by 3 others, another by 2, and 10 others by one each in the response population. The rest of the 48 females in the population scored zero information potential on this ground. In other words, 13 women were mentioned as most frequently contacted persons for information 22 times (average 1.69) but 410 men were mentioned as most frequently contacted persons for information 1241 times (average 3.03). This is a substantial difference in the information potentiality for interpersonal communication in the given environment between men and women. In addition as many as 48 out of 61 women technologists (i.e. 78.7%) were not considered by any of the 391 respondents to be one of the five persons most frequently contacted for information.

From the above analysis the potential of women space technologists for imparting information in the informal communication structure/network is highly limited. It is also obvious that there is an inhibition on the part of men to contact women colleagues for information, and not necessarily the other way round, even though women in principle have just as much information to impart as men.

Use of library documents and user interactions with the library

In addition to the questionnaire survey, a semicontrolled usage study was carried out recording the number of library documents borrowed by space technologists. It was based on a 20% systematic random sample of books and reports over 10 months and two latest issues of 487 current journals over three months (Sridhar, 1985, 1986). Similarly their interactions with the library in terms of the number of books and reports reserved in a year and number of times the primary library was visited/reading seats were occupied in a three months period were also collected (Sridhar, 1982, 1983).

It was found that the sex of respondents had no influence on number of books, reports and journal issues borrowed in the use study. (Tables 11, 12, and 13). However, there was a significant difference in number of journal titles used by men and women space technologists (Table 14). The average number of journal titles used by men and women, respectively, were 0.87 and 1.13.

In in-house use of the primary library women space technologists have significantly differed from men (Table 15). The average number of times women and men space technologists were observed making in-house use of library documents respectively were 3.92 and 2.48. The same is true as far as the number of documents reserved by women respondents was concerned (Table 16). The average number of reservations made by men and women respondents respectively were 2.19 and 2.84¹

CONCLUSION

From the analysis of the data so far presented it is clear that women space technologists did not differ significantly from men in (1) amount of time spent in information gathering; (2) relative time spent on formal and informal sources of information; (3) relative dependence on formal and informal sources of information; (4) degree of dependence on various informal and interpersonal sources of information; (5) number of interpersonal contacts within the organisation; (6) number of interpersonal contacts outside the organisation; (7) consulting experts in the field for bibliographic references; (8) consulting colleagues and fellow professionals for bibliographic references; (9) consulting library staff for bibliographic references; (10) degree of delegation of information gathering work; and (11) the number of books, reports and current journal issues

¹Women space technologists have scored much higher than men in both 'library use index' and 'library interaction index' developed in the study. The average use index value of men and women space technologists, respectively were 15.51 and 20.96. The average interaction index values of men and women were 5.09 and 5.41 respectively.

Table 11 Number of books borrowed

Number of books borrowed	Men		Women		Total
	No.	%	No.	%	
None	220	29.8	12	19.7	232
1 - 2	184	24.9	18	29.5	202
3 - 5	166	22.5	12	19.7	178
6 - 10	115	15.6	11	18.0	126
11 or more	54	7.3	8	13.1	62
Total	739	100.1	61	100.0	800

($\chi^2 = 5.32$, $df = 4$, $p > 0.05$)

Table 12 Number of reports borrowed

Number of reports	Men		Women		Total
	No.	%	No.	%	
None	675	90.8	58	95.1	733
1 or more	68	9.2	3	4.9	71
Total	743	100.0	61	100.0	804

($\chi^2 = 1.26$, $df = 1$, $p > 0.05$)

Table 13 Number of journal issues borrowed

Number of journal issues	Men		Women		Total
	No.	%	No.	%	
None	503	68.0	33	54.1	536
1 - 2	130	17.6	18	29.5	148
3 - 5	66	8.9	5	8.2	71
6 or more	41	5.5	5	8.2	46
Total	740	100.0	61	100.0	801

($\chi^2 = 6.7$, $df = 3$, $p > 0.05$)

Table 14 Number of journal titles used

Number of journal titles	Men		Women		Total
	No.	%	No.	%	
None	498	67.8	33	54.1	531
1 - 2	157	21.4	22	36.1	179
3 - 5	56	7.6	3	4.9	59
6 or more	23	3.1	3	4.9	26
Total	734	99.9	61	100.0	795

($\chi^2 = 8.09$, $df = 3$, $p > 0.05$)

Table 15 Inhouse use of library documents by seat occupancy

Frequency of use/seat occupancy in three months sample	Men		Women		Total
	No.	%	No.	%	
Nil	348	48.7	20	35.1	368
1 - 5	273	38.2	19	33.3	292
6 - 10	68	9.5	15	26.3	83
11 or more	25	3.5	3	5.3	28
Total	714	99.9	57	100.0	771

($\chi^2 = 17.03$, $df = 3$, $p > 0.05$)

Table 16 Number of reservations made

Number of reservations	Men		Women		Total
	No.	%	No.	%	
None	326	53.3	10	27.0	336
1	80	13.1	5	13.5	85
2	63	10.3	9	24.3	72
3 - 5	67	10.9	8	21.6	75
6 - 10	50	8.2	4	10.8	54
11 or more	26	4.2	1	2.7	27
Total	612	100.0	37	99.9	649

($\chi^2 = 14.77$, $df = 5$, $p > 0.05$)

borrowed. However, the women tended to have fewer interpersonal contacts outside the organisation than men (significance level 0.10). Surprisingly, they tended to consult experts for bibliographic references more than men (significance level 0.10). Above all, women space technologists have made *significantly* (significance level 0.05) more interactions with the primary library sources than men in terms of in-house use and number of reservations made for books and reports as well as journal titles used.²

From the result of this study it is clear that women space technologists were more information-conscious and active than men as far as seeking information from formal sources of information like library documents and contacting interpersonal sources of information within the organisation are concerned. Hence, women are intrinsically more capable of supplying information than men. However, the women have had a natural obstacle in accessing interpersonal sources of information outside their organisation. The disadvantageous position of women, if any, relates to their inability to move out of the organisation in tapping

interpersonal sources of information. On the other hand there appeared to be an inhibition on the part of men due to sociocultural background in contacting women colleagues for

²It is quite interesting to note that similar observations were made in a twin survey on attitudes of students to the Southampton University library in May 1965. It was concluded that one of the two special features of the survey was '... the greater use made of libraries by women. They used the University library far more for recreational reading, and borrowed more from it for vacations; they used the catalogue more and were more satisfied with the catalogue entries; they had more confidence in the library staff, but were more reluctant to ask their queries and were more 'intimidated' by the library on first arrival; ... These differences exist within each faculty, and are all statistically significant (most of them highly significant). The explanation must surely lie in personality factors; presumably women are on the whole more amenable and perhaps more conscientious than men, more ready to admit they need help and less ready to criticise'.

Vide LINE, Maurice B. and TIDMARSH, Mavis, Student attitudes to the university library: a second survey at Southampton University. *J. Doc.* 22: 1966. 123-135.

information, and not necessarily vice versa. As a result the potential of women as information suppliers is not realised. The result is that they never become information stars. There may be other factors like the placement of women at middle level in the organisational hierarchy and qualities and abilities of women space technologists in transmitting information, which are not explored in this study.

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