CUSTOMER-CHARACTERISTICS AS CRITERIA FOR MARKET-SEGMENTATIONIN LIBRARIES *

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Abstract: Highlights the limitations of marketing approach to library and information services. Reviews literature on correlation of information requirements of scientists and engineers with their characteristics. Analyses the data collected for a larger study of information-behaviour of the Indian space technologists, and correlates nature and type of information required by the space technologists with their hierarchical status, educational qualifications, nature of work, subject of specialisation, length of work experience and professional activities and achievements. Compares the results with the findings of earlier studies. Finally, concludes that the market segmentation of the Indian space technologists as users of their `primary library' is possible based on their characteristics like status, qualifications, specialisations, nature of work, professional activities and achievements and the library should be cognizant of this possible segmentation of target market for providing information services.

1. INTRODUCTION

User-research is the market-research in library and information field. Hence, the market-characteristics or customer-characteristics can be conveniently called user-characteristics for our purposes. Before I discuss various user-characteristics which can be used to segment our market with a case study of Indian space technologists (IST) as users of their `primary library', let me caution myself of the limitations of marketing approach to library and information services. Marketing library services is something new to libraries. At the most, promoting of library services is taking place in the profession so far. Libraries which function with the motto of `free service to all' can hardly claim selling or marketing its services. It is meaningless to market a free service or product. Being paternalistic systems, libraries try to create awareness among users and

persuade them to use information, documents and other library services which they think are needed by their users. Under this situation any assessment of `demand' is dubious. If we really mean selling and marketing of library services, many libraries around us with `catch-all' and `do-all' policies may have to be heavily trimmed or stripped down. Users will be shocked to know the exhorbitant cost of information and even `cost per use' of document. Here we use the term market to mean the predetermined domain of our customers as per the laid down objectives and not really in the broad sense in which a typical businessman uses it. No doubt that market-research (user-research) and customer (user) behaviour studies are essential for libraries.

2 CORRELATION OF INFORMATION-REQUIREMENTS OF SCIENTISTS AND ENGINEERS WITH USER-CHARACTERISTICS : SOME PAST FINDINGS

Before I review some of the results of the past user-research where user-characteristics are related to information-requirements let me make it clear that many of these studies are speculative and do not intend to segment their target market but to gain knowledge about behaviour of their customers. The information-needs and requirements have been correlated in the past with discipline (by Singh, Aims, Gray and Perry), nature of employment (by Hanson), nature of work (by Wilson, Gray and Perry), status (by Singh) and experience (by Garvey and others) of users. Unfortunately, the important factors or characteristics which substantially affect user-needs and requirements are not clear and correlation of information needs with many other user characteristics like educational level, performance, etc., have not been dealt with sufficiently in pragmatic studies.

Aims (1965) hypothesised that the information-needs of engineers differ widely from those of physicists and chemists and Gray and Brain (1975, p 53) speculated that engineers differ widely from those of R&D workers in their information-needs. The differences in needs and demands for information are more strongly related to the kind of employment and type of organisation than the discipline in another study (Hanson, 1964, p 69-70). An observation that electronics and telecommunication and industrial engineers cite to the maximum from other disciplines (B.N.Singh, 1981, p 183) is highly vague as an equally strong interdisciplinary need for information is expected in many other disciplines too. Surprisingly, and contrary to others, Raitt (1984, p 255) has generally confirmed his hypothesis that "...the information needs and communication patterns of scientists and engineers in general are similar and cannot be readily distinguished."

Shuchman (1981) has tried to relate five variables to the nature and type of information sought by American industrial engineers and found that the job activity and type of industry appeared to make the most consistent difference. The occupational role and the nature of work of user is considered to be the most important clue for understanding personal information-gathering behaviour by Wilson (1977, p 50). As engineers perform a wide variety of functions, their information-needs are quite varied depending on their respective functions. For example, design engineers need numerical data in a compact and easily usable form (Gray and Brain, 1975, p 55). A recent contrary finding is that the status of the scholars belonging to the research community did not appear to be influencing their information needs (B.N.Singh, 1981, p 182). In another survey, it is found that the least

experienced scientists have greater information-needs than the most experienced (Garvey, et.al., 1975, p 501).

The above findings are so speculative, theoretical and diverse that generalisation to segment the market based on user-characteristics is made difficult. Yet findings studies conducted with sound methodology could be taken as basis for segmenting the market.

3 CORRELATION OF NATURE AND TYPE OF INFORMATION REQUIRED BY THE INDIAN SPACE TECHNOLOGIES WITH USER-CHARACTERISTICS

The felt and expressed information requirements of the IST, in respect of nature and type of information, are ascertained through a questionnaire independently designed and tested for the purpose as part of a larger information behaviour study (Sridhar, 1987). The response rate in this census survey was 68.5% and the defined population of IST included over 800 scientists, engineers, technicians and technocrats of ISRO Satellite Centre, Bangalore. The data so collected has been tested for correlation/association with selected user-characteristics. The results of association/correlation tests of nature and type of information sought with status, qualifications, nature of work, specialisation, experience and professional activities and achievements[1] of the IST are presented in Table 1. One may observe statistically significant relation of need for

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1. An index was developed for each person in the population based on various quantifiable professional activities and achievements like lectures delivered, conferences attended, reports prepared, papers published, patents obtained, awards received, membership in professional bodies, official tours, journals subscribed, committees represented, in service training's received, part-time studies undertaken, etc., in a specified period adjusted to length of experience.

state-of-the-art literature (A), computer programs and model building information (F) and standard and patent specifications (G) with all the above characteristics. But the requirement of physical, technical and design data (H) is found to be independent of all the above user-characteristics, except status. Tables 2, 3, 4 and 5 respectively present the weighted mean score of nature and type of information sought versus status, qualifications, nature of work and specialisation.

Table 2 reveals that as the status of a user raises, his requirement for state-of-the-art and review literature (A) (r_s=0.95), experimental results (C) (r_s=0.92), product, material and equipment information (E) (r_s=0.98), computer programs and model building information (F) (r_s =0.72) and physical, technical and design data increases linearly. But the requirement of standard and patent specification (G) (r_s =-0.72) decreases linearly as status increases.

It may be seen in Table 3 that the requirement of all types of information except physical, technical and design data (H) and S&T news (I) has varied significantly with the level of qualifications of the space technologists. The relation is not linear in case of any type of information.

Table 4 shows that the need for state-of-the-art and review literature (A), methods, processes and procedures (D), computer programs and model building information (F),standard and patent specifications (G) and statistical, economic, business and general

information has varied significantly with the nature of work of the IST.

As could be seen from Table 4, physicists have sought more of state-of-the-art and review literature (A), experimental results (C), product, material and equipment information (E) and S & T news (I) than other types of information. Compared to others, mathematicians have naturally sought more of computer programs and model building information (F), and mechanical engineers have sought more of standard and patent specifications (G). The requirement of state-of-the-art and review literature (A) and theoretical background (B) is strongest among aeronautical and structural engineers. Electrical engineers require more of experimental results (C) and S & T news (I) than other types of information. Lastly, electronics engineers have also sought more experimental results (C) together with physical, technical and design data (H) than other specialists[2].

It can also be inferred from the Pearson product moment correlation coefficients (r) in Table 1 that higher the experience of the space technologists higher the need for state-of-the-art literature (A) (r=0.16), standard and patent specifications (G) (r=0.12) and S & T news (I) (r=0.13), but lower the need for theoretical background (B) (r = -0.12) and computer programs and model building information (F) (r=-0.21) and vice versa.

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2. However, the need for following types of information varied significantly with the subject of specialisation of the IST. State-of-the-art literature (A), experimental results (C), product, material and equipment information (E), computer programs and model building information (F), standard and patent specifications (G), S & T news (I) and statistical, economic, business and general information (J).

The professional activities and achievements of the IST are positively correlated with the need for state-of-the-art literature (A) (r=0.42), methods, processes and procedures information (D) (r=0.13), and computer programs and model building information (F) (r=0.23) but negatively correlated with the need for standard and patent specifications (G) (r=-0.21).

The need for the state-of-the-art literature for the IST is, very highly, linearly and positively correlated/associated with status (r_s=0.95), qualifications and nature of work, slightly and positively with experience (r=0.16), moderately and positively with professional activities and achievements(r=0.42). The need for theoretical background is almost linearly and positively related to qualifications of users and slightly and negatively correlated (r=-0.12) with length of experience of users. The need for experimental results is very highly and positively correlated (r_s=0.92) with status of users. The qualifications and specialisation of users are also related to the need for experimental results. The degree of requirement of information related to methods, processes and procedures showed a significant relation with qualifications and nature of work and a slight positive correlation (r=0.13) with professional activities and achievements of the users. The need for product, material and equipment information has almost perfectly and positively correlated (r_s=0.98) with status and has a significant relation with qualifications and specialisation of the users. Mathematicians and aeronautical and structural engineers have lesser need and others a higher need for product, material and equipment information which is on line with findings of Shuchman (1981, p68). The need for computer programs and

model building information has a low negative correlation (r=-0.21) with experience, low positive correlation (r=0.23) with professional activities and achievements of users, a high positive rank order correlation (r_s=0.73) with status, a linear relationship with qualifications, curvilinear relationship with nature of work and a significant relationship with specialisation of the IST[3].

The need for standard and patent specifications is highly and negatively correlated with status (r_s=-0.72), slightly and positively with experience (r=0.12), slightly and negatively with professional activities and achievements (r=-0.21), and has significant relation with qualifications, nature of work and specialisation of the users. The need for physical, technical and design data is highly and positively correlated (r_s=0.72) only with status of the users. The requirement of S & T news is significantly related to specialisation of the users and slightly and positively correlated (r=0.13) with length of experience of the users. The `need for statistical, economic, business and general information' is highly and positively correlated (r_s=0.71) with status and significantly related to qualifications, nature of work and specialisation of the users.

From the above discussion and the data in Table 2, it is clear that the status of the user has a significant relation with all types of information listed, except S & T news and methods, processes and procedures. Hence, the observation of B.N.Singh (1981, p182) that status does not influence the information-needs is disproved

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3. Shuchman (1981, p73-74) has reported that "the aerospace engineer is a large user of computer information".

in the present study. Further, the general observation of Garvey and others (1975, p501) that the information needs of least experienced are greater than those of the most experienced is true, as far as theoretical background/ basic S & T information (not S & T news) and computer programs and model building information are concerned. However, the reverse is true as far as state-of-the art, S & T news and standard and patent specifications are concerned (See Table 1 under experience column).

In case of American industrial engineers, Shuchman (1981) has reported that out of the five variables used to evaluate the responses to nature and type of information sought, the job activity and type of industry appeared to be the two that make the most consistent difference. The qualification (degree) and the date of acquiring the qualification were not significant variables. As it could be seen from the Table 1, the present study does not support the observation of Shuchman. For the Indian space technologists, the status and qualfications made the most consistent difference in (eight of the ten) types of information sought followed by the subject of specialisation (in seven types of information), nature of work and experience (each in five types of information) and professional activities and achievements (in four types of information) and the target market can be conveniently segmented by these user-characteristics.

4 CONCLUSION

Being paternalistic systems it is very difficult for libraries to adopt strict marketing approach. Yet it is desirable for them to have extensive market-research (ie.,

user-research) and customer (user) behaviour studies in order to make themselves effective to their customers.

Most of the results of past studies on correlating information-requirements to user-characteristics are either speculative or theoretical in nature and are not supported by a rigorous analysis of hard data. The characteristics of users which substantially affect user-requirements are not clearly established. Past studies have not addressed the information-needs and requirements of under-privileged and deprived users and nonusers and have also not explored the ways of dissipation of unmet needs (Ford, 1977, p 20).

It can be concluded from the analysis of the data presented above that the IST as users of their `primary library' can be segmented by their characterstics such as status, educational qualifications, subject of specialisation, nature of work, experience and professional activities and achievements for planning and providing information services. As the information requirements of each segment within the IST has significantly varied from others the `primary library' should take note of such take note of such segmentation within its target market.

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TABLE 1 : Association/Correlation Test Results of Nature and Type of Information Required with (Selected) User-Characteristics

Nature and Type of Information	Status (r_s) df = 8	Qualifications (x^2) df = 16	Nature of work (x^2) df = 24	Specialisation (x^2) df = 20	Experience (r) df ≒ 390	Professional Activities & Achievements Index (r) df ≒ 192
A. State-of-the-art	0.95*	176.56*	97.86*	83.96*	0.16*	0.42*
B. Theoretical background	0.55	56.20*	29.50	20.11	—0.12*	0.02
C. Experimental results	0.92*	44.35*	27.27	39.51*	0.02	0.09
D. Methods, processes and procedures	0.58	51.20*	45.56*	29.79	—0.03	0.13*
E. Product, material & equipment information	0.98*	27.25*	22.26	43.01*	0.08	0.08
F. Computer programs & model building information	0.72*	83.23*	46.22*	104.30*	—0.21*	0.23*
G. Standard and patent specifications	—0.72*	73.46*	39.36*	67.16*	0,12*	—0.21*
H- Physical, technical and design data	0.72*	13.25	35.79	29.48	0.04	—0.03
I. S & T news	0.43	22.80	21.94	39.98*	0.13*	0.07
J. Statistical economic, business and general information	0,71*	38.30*	41.48*	32.20*	0.05	0-05

Key : *, The association/correlation is statistically significant at 0.05 significance level (p) for a two-tailed test.

Note : The tabulated values of x^2 at 0.05 significance level (p) for a two-tailed test for 16, 24 and 20 degrees of freedom (df) are 26.296, 36.415 and 31.410 respectively.

TABLE 2 : Nature and Type of Information Required Vs Status

(Mean Score)

Nature & Type of Information	Status											r_s
	A, B, C & D	E	F	G	H	I	J	K	L	M & N	Total	
A State-of-the-art	3.29	3.37	3.06	2.27	1.92	144	1.00	0.88	1.21	0.41	2.00	0.9515*
B Theoretical background	2 81	2.75	2.96	2.74	2.80	2.81	2.82	2.31	2.63	2·11	2.74	0.5515
C Experimental results	2.76	2.85	2.87	2.60	2.67	2.39	2.44	1·84	2.23	1.82	2·53	0.9152*
D Methods, processes and procedures	2·05	2.51	2.37	2.25	2.33	2.25	2.32	1.92	2.10	1.60	2·25	0.5758
E Product, material and equipment information	2.62	2.27	2.54	2.21	2.19	2.04	2.19	2.04	1.93	1.79	2.16	0.9758*
F Computer programs and model building information	1.52	1.73	1.84	1.65	1.56	1.53	1.55	1·04	0.95	0.47	1.49	0·7212*
G Standard and patent specifications	0.95	1.38	1.30	1.08	2.14	1·65	1.83	2.04	2.00	2.00	1·52	-0.7242*
H Physical, technical and design data	2.38	2.46	2.54	2.45	2.39	2.38	2.43	2.21	2.30	2.44	2·36	0.7227*
I S & T news	2.95	3.02	2.90	2.61	2.67	2.76	2.82	2.52	2.88	2.89	2.72	0.4303
J Statistical, economic, business and general information	1.59	1.38	1.30	1.04	1.27	1.02	1.27	1.09	1.15	0.65	1.14	0.7121*

Key : r_s, Spearman rank order correlation ;*, the critical value of t at 0 05 significance level in a two-tailed t-test for 8 degrees of freedom is 2.306 and the correlations marked * are found valid at 0.05 significance level as their t-value exceed 2.306.

Note : 1. Status A to N are in the descending order of hierarchical rank.
2. Mean score refers to mean of the responses on a five point scale ranging from 0 to 4.

TABLE 3 : Nature and Type of Information Required Vs Qualifications

(Mean Score)

	Nature and Type of Information	Qualifications					Total	x^2
		U	D	B	M	P		
A	State-of-the-art	0.93	1.21	2.18	2.58	3.52	1.96	176.5601*
B	Theoretical background	2.31	2.88	2.86	2.75	3.35	2.76	56.2022*
C	Experimental results	1.96	2.53	2.75	2.58	2.78	2.52	44.3481*
D	Methods, processes & procedures	1.72	2.40	2.28	2.18	2.96	2.21	51.1971*
E	Product, material & equipment information	1.87	2.27	2.41	2.09	2.35	2.19	27.2499*
F	Computer programs & model building information	0.80	1.38	1.50	1.91	2.43	1.52	83.2269*
G	Standard & patent specifications	2.08	1.91	2.58	1.05	1.17	1.49	73.4616*
H	Physical, technical & design data	2.29	2.62	2.46	2.34	2.43	2.42	13.2545
I	S & T news	2.66	1.13	2.73	2.70	2.91	2.74	22.7967
J	Statistical, economic, business and general information	0.88	1.10	1.38	1.16	1 00	1.16	38.2992*

Key : *, The association is statistically significant at $p=0.05$ as the tabulated value of x at $p=0.05$ for 16 degrees of freedom is 26.296 ; *Qualifications*-U, Undergraduate ; D, Diploma holder ; B-Graduate ; M, Post-graduate ; P-Doctorate.

Note : 1. The contingency tables on which chi-square test is made are not shown.

2. Mean score refers to mean of the responses on a five point scale ranging from 0 to 4.

TABLE 4 : Nature and Type of Information Required Vs Nature of work

(Mean Score)

	Nature & Type of Information	Nature of work							Total	x^2
		A	B	C	P	D	E	F		
A	State-of-the-art	2.83	2.47	2.18	2.32	1.21	1.56	1.85	1.95	97.8563*
B	Theoretical background	2.62	2.84	2.83	3.03	2.58	2.74	2.90	3.24	29.5012
C	Experimental results	2.43	2.44	2.71	2.89	2.40	2.53	2.79	2.52	27.2735
D	Methods, processess & procedures	2.20	2.20	2.29	2.50	2.04	2.31	2.05	2.20	45.5626*
E	Product, material, & equipment information	2.45	1.79	2.31	2.41	2.16	2.19	1.89	2.19	22.2593
F	Computer programs & model building information	1.55	1.95	1.69	1.82	1.13	1.38	1.30	1.52	46.2171*
G	Standard & patent specifications	1.36	1.14	1.45	1.39	1.76	1.58	1.74	1.97	39.3603*
H	Physical, technical & design data	2.24	2.16	2.57	2.68	2.43	2.10	2.16	2.41	35.7004
I	S & T news	2.83	2.72	2.74	2.61	2.76	2.62	2.50	2.73	21.9382
J	Statistical, economic, business and general information	1.43	1.43	1.16	0.08	0.98	1.26	1.25	1.16	41.4792*

Key : *, The association is statistically significant at $p=0.05$ as the tabulated value of x^2 at $p=0.05$ for 24 degrees of freedom is 36.415 ; *Nature of work*—A, Management/Supervision ; B, Planning/System Analysis ; C, Development ; P, Both C & D ; D, Fabrication and Testing ; E, Operational Activity ; F, Others.

Note : 1. The contingency tables on which chi-square test in made are not shown.

2. Mean score refers to mean of the responses on a five point scale ranging from 0 to 4.

TABLE 5 : Nature and Type of Information Required Vs Specialisation of Users
(Mean Score)

	Nature and Type of Information	Specialisation						Total	x^2
		A	C	E	F	H	I		
A	State-of-of-the-art	2.60	1.74	1.17	2.89	2.06	2.21	1.94	83.9622*
B	Theoretical background	2.98	2.85	2.71	3.11	2.71	2.68	2.74	20.1062
C	Experimental results	2.67	1.74	2.34	2.42	2.71	2.70	2.54	39.5062*
D	Methods, processes & procedures	2.62	2.32	2.07	2.32	2.29	2.18	2.20	29.7875
E	Product, material and equipment information	2·45	1.11	2.23	1.84	2.24	2.26	2.20	43.0080*
F	Computer programs & model building information	2.00	3.10	0 85	2.05	1.53	1.51	1.46	104.3037*
G	Standard & patent specification	0.93	1.11	2.15	0.95	1.35	1.35	1.52	67.1592*
H	Physical, technical & design data	2.29	1.83	2.53	2.11	2.41	2.49	2.43	29.4793
I	S & T news	3.05	2.65	2.60	2.32	2.94	2.82	2·75	39.9815*
J	Statistical, economic, general information	1.21	1.22	0.92	0.63	1 24	1.19	1.09	32.1956*

Key : *, Association is statistically significant at p=0.05 as the tabulated x^2 value at df=20 & p=0·05 is 31.410 ; *Specialisation*-A, Physics ; C. Mathematics ; E, Aeronautical and structural Engineering; H, Electrical Engineering ; I, Electronics.

Note : The contingency tables on which chi-square test is made are not shown.

2. Mean score refers to mean of the responses on a five point scale ranging from 0 to 4.

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