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FINDINGS, SUGGESTIONS AND CONCLUSION

6.1. Introduction

Analysis of data on the use of electronic resources and services by marine scientists in south India of the sample respondents are presented with inferences in Chapter 5. The present chapter deals with the major findings and observations based on the data analysis performed in Chapter 5. To substantiate the hypotheses and to fulfill the stated objectives in Chapter 1, the major findings are presented in this chapter which is broadly classified under suitable headings substantiated by relevant table and figure numbers.

6.2. Major Findings

6.2.1. Marine Science Libraries in South India

1. Out of thirteen libraries, three were established between 1925 and 1947, i.e. before independence. Five were established between 1960 and 1970, and remaining five were established during 1980’s-1990’s (Table 4.1).

2. It is also observed that out of thirteen libraries seven libraries were founded by the central government and six by the state government (Table 4.1).

6.2.2. Background Information of Marine Science Libraries

3. Maximum number of libraries (07) are attached to marine science research and development institutions and six libraries including fisheries college libraries are attached to academic institutions (Table 4.1).

4. Twelve libraries are centralized and only one library is decentralized (Table 4.1).

5. Five libraries providing database services and seven libraries are fully automated and six libraries are partially automated (Table 4.5).
6.2.3. **Background Information of the Respondents**

6. The sample population used in the present study contains more number of male scientists (68.2%) than female scientists (31.8%) and more number of male faculties (75.4%) than female faculties (24.6%), (Table 5.1 and Table 5.2).

7. Average number of scientists in a large number of marine science research institutes is in the range of 32 to 60. Only two research institutes viz., NIOT (150) and CMFRI (101) are having a large number of scientists. In case of academic institutes, a small number of marine scientists are working i.e. in the range of 5 to 22 (Table 4.4).

6.2.4. **Information on use of library resources**

8. A large number of scientists most frequently used Internet facility (83.7%) and is ranked first among various channels of information, followed by searching online database (67.4%) and electronic journals (CD-ROMs) (57.7%), which are ranked second and third respectively (Table 5.3).

9. A maximum number of faculty members used Internet facility (77.8%), searching online database (47.6%), electronic journals (45.2%) as modes for accessing information and which are ranked first, second and third respectively (Table 5.4).

10. The majority of marine scientists used journals which are ranked first, Internet is ranked second, online resources third, CD-ROMs/DVDs forth and research reports fifth in position. It is a surprise to know that the book is placed in the tenth rank and patents and standards are placed in the fourteenth position (Table 5.5).

11. The majority of faculty members more often used journals as sources of information (73%) followed by online resources oftenly (57.9%) and books (56.3%), CD-ROMs/DVDs (54.8%) and research reports (51.6%). More number of users used abstracting journals (59.5%), conference proceedings (54%) and theses (47.6%). As per expectations occasionally used sources are encyclopedia (57.1%) and directories (50%), (Table 5.6).
12. All the documentary sources of information were subjected to standard deviation test more often than not at all. It was found that journals got the first rank value of 0.68 in this study and cassettes got the last rank value of 1.06 (Table 5.6).

13. A considerable number of scientists depended on other R&D libraries for journals (28.5%), research reports (25.1%), patents/standards (20.1%), and books (17.2%). The range of 2% to 9% of users also depended on other academic libraries for books, CD-ROM databases, theses, journals etc.

Based on the opinion of users, one can say that their institutional libraries are meeting their information needs at maximum extent. It is also observed that the weighted average is in the range of 1.0 to 1.4. In case of faculty members working in marine and fisheries department a large number of them depend on their institution library (Table 5.7).

14. Cent percent of respondents have accessibility to bibliographical tools and directories and a maximum number of respondents also have accessibility to encyclopedia (99.2%), subject portals (96.8%), cassettes (90.5%), abstracting journals (88.9%), year books (87.3%) and conference proceedings, patents and standards (81% each). Like scientists, faculty members opined that they depended on other R&D libraries for periodicals (26.2%), books (24.6%), online database (23%) and patents/standards and research reports (16.7% each), (Table 5.8).

6.2.5. Information about use of E-Resources

15. A large number of respondents said yes for availability of CD-ROMs (95.4%), online/CD-ROM database (94.1%), e-journals (92.1%) and e-books (78.7%), (Table 5.9).

16. A large number of faculties (61.9%) and scientists (81.2%) access e-resources in the department. It is followed by library where 7.1% of faculties and 13% of scientists access e-resources. Home is the last place where 6.3% each of faculty members and scientists access e-resources (Table 5.11).
17. The majority of scientists use e-resources for professional development (62.5%) followed by writing research project (55.6%). Quite a good number of scientists partially agreed that they used e-resources for chatting (63.2%), publishing (49.4%) and lesson plans (46.4%), (Table 5.12).

18. A large number of faculty members fully agreed that they used e-resources for communication with professionals (61.1%) followed by professional development (50.8%) and research project (31.7%). It is also observed that a substantial number of faculty members agree that, they use it for research/project writing (66.66%), placement (54%), accessing, online database (46%) and downloading e-resources (45.2%), (Table 5.13).

19. Study found that e-journals, databases and full text articles are highly utilized sources and ranked them first, second and third respectively. Availability and need would be the reason for higher utilization of these e-resources (Table 5.14).

20. A majority of respondents (69.8%) amongst marine science faculties gave importance to search the database. It is followed by visit library website (65.97%) and online reference sources (62.7%) (Table 5.15).

21. The majority of respondents opine that fast access and delivery of information (88.7%), the provision of accurate and current information (79.9%) and exploring a wide area of information sources nearer to the interested topic are the reasons for accessing e-resources (Table 5.16).

22. A large number of scientists spent more time to access full text articles with WA 2.73 and it is ranked first. The online reference source is the second most widely accessed tool (WA is 2.67). It is followed by browse e-journals (WA 2.29) and use e-books (WA 2.07) (Table 5.18).

23. It is apparent from table-5.19 that, in general, maximum time spent to access to full text articles with WA 3.18 as first rank. While browse e-journals (WA3.15) and online reference sources (WA3.09) are the sources, on which maximum time is spent by respondents (Table 5.19).
24. Good number of respondents spent one hour for search database (62.7%), to fill online ILL form (44.4%) and visit the library website (43.7%). A countable number of respondents spent more than two hours for browse e-journals (41.3%), access to full text articles (31.7%) and use e-books and online reference sources (31% each) (Table 5.19).

25. Satisfaction level of scientists by source wise. A large number of scientists were satisfied with websites (62.3%), full text databases (56.1%) and e-journals (41.8%). It is also observed that 49% and 36% of scientists were dissatisfied with online ILL forms and e-books respectively (Table 5.20).

26. Among the faculty members, micro level differences may be found compared to scientists. Full text database (WA 2.15) is ranked first, e-journals and websites (WA2.25 each) shared the second rank. In case of dissatisfaction, dissatisfaction level is high with ask a librarian (WA3.13), online ILL form (WA 3.12) and e-books (WA 3.06) (Table 5.21).

6.2.6. Performance of the library in satisfying users' information needs via electronic resources

27. The majority (98.1%) (strongly agree 7.5% and agree 91.2%) of the respondents agree that the library offers adequate instruction and assistance on the use of e-resources. Very small percent of respondents (0.8%) were neutral and 0.4% disagreed. Faculty members also agreed in accordance with scientists (Tables 5.22 and 5.23).

6.2.7. Ease use of Electronic Resources

28. A general view of rating the quality of e-resources. 90% of scientists agreed with the high quality of information acquired from e-resources, whereas 9.6% of scientists said somewhat high quality of e-resources and 0.4% of scientists agreed with the poor quality of information acquired from e-resources (Table 5.24).
29. 96% of faculties who said high quality of information could be acquired from e-resources, 2.4% said somewhat high quality and only 1.6% said it poor quality of information. It is significant to note that a number of scientists and faculty members, who said somewhat high quality and poor quality, is very less (Table 5.25).

30. A large number of scientists rated e-resources as fast (51.5%) and followed by very fast (37.2%) and somewhat fast (10.5%). Only two respondents rated it as slow. Faculty members are also of the opinion of scientists. 43.7% faculty rated as fast and followed by very fast (31%) and somewhat fast (17.5%). But marginally large number of respondents (7.9%) rated it as slow (Tables 5.26 and 5.27).

31. A large number of scientists rated the usability of library website as somewhat easy (42.3%) followed by easy (39.3%) and very easy (15.1%). Whereas a large number of faculty members rated the usability of library websites as easy (55.6%) and somewhat easy (23.8%) (Tables 5.28 and 5.29).

6.2.8. Internet

32. It is found from table 30 that a huge number of scientists accessed research articles (96.7%), and research reports (94.6%) with WA 1.03 and 1.09 respectively. These sources are followed by research abstracts (77.8%) and information on training/conferences/seminars (45.2%). Whereas a large number of faculty members accessed research abstracts (94.4%) and research articles (90.5%). It is interesting to note that both scientists and faculty members placed training/conferences/seminars and patents/standards in fourth and fifth ranks respectively.

It may be summarized after looking at Table 5.30 and Table 5.31 that information sources on bibliographical information, career planning/ higher education, placement and job opportunities and software based information are less used information sources by both scientists and faculty members.

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33. The data reveals that a large number of scientists used www (95%) and e-mail (69.9%) most frequently. Quite a good number of scientists used discussion forum (47.3%) frequently and occasionally news groups (41.8%). In case of faculty members, www (91.3%), e-mail (74.6%) and online databases (63.5%) are highly utilized. Internet services and they are ranked first, second and third respectively. One can also observe from Table 5.32 and Table 5.33 that a large number of respondents i.e. in the range of 60% to 90% never used freeware/shareware, Gopher, Telnet and FTP.

34. The majority (73.2%) of respondents used Internet, described it as wealth of useful current information and ranked it first, followed by effective communication tool (64.4%) as described by users. Further a large number of scientists (61.2%) described Internet as a source for huge information but difficult to obtain, 55.2% of respondents are agreed as it enhances the knowledge. 53% opined that it will be a supplement to library as online library and 52.3% said that it has a great reference value and a mechanism to save time (Table 5.34).

35. A large number of faculty members strongly agreed that Internet is a wealth of huge useful current information (84.9%). It is an effective communication tool (64.3%), it enhances knowledge (54%) and these are ranked first, second and third and fourth respectively (Table 5.35).

6.2.9. Search Strategy

36. The different modes of searching information were also followed by the respondents which indicate browsing websites (58.6%) most oftenly and is ranked first. A large number of scientists used interaction with colleagues (77%), follow up references (67.8%) and publications/magazines (63.6%) as a source for searching information on Internet. On the other hand, more than half per cent of faculty members most often used publications/magazines (57.9%) and search engines (56.3%) as a source for searching information (Tables 5.36 and 5.37).
37. Cent percent of faculty members and 98.7% of scientists used Google and ranked it first. Yahoo is the second highly preferred search engine by faculty members (95.2%) and scientists (91.2%) and it is placed at second rank. This is followed by rediff (90.4%) and WebCrawler (86.6%) (Table 5.38).

6.2.10. Internet Problems/Satisfaction/Evaluation

38. The highest number of respondents said no problem for getting connected (89.1%) to Internet or problem of frequent disconnection (82.8%), and low bandwidth (65.3%). But a substantial number of users speak of pop-up-ads/screens (48.1%), lack of training (41.8%) and power fluctuation (38.5%) as some of the problems faced during Internet search (Table 5.39).

39. Like scientists faculty members did not encounter problems while browsing Internet. The majority of faculties opined that they were not facing any problems like getting connected (73.8%), frequent disconnection (64.3%) and low bandwidth (57.1%). It is observed from the table that the problems which are faced by scientists are also faced by faculty members (Table 5.40).

40. Majority of respondents do not have any problem in the use of www (85.8%) and e-mail (84.1%) services. On the other hand quite a good number of scientists faced more problems while using Gopher (51%), freeware/shareware (48.1), Telnet and chatting (47.7% each) (Table 5.41).

41. In case of faculty, a large number of respondents expressed that they do not have any problem in using e-mail (78.6%), www (76.2%) and online data bases (74.6%). Compared to scientists relatively, a small percent of respondents faced more problems in the use of Telnet (57.9%), FTP (30.2%) and freeware/shareware (28.6%) (Table 5.42).

42. Among the features of Internet, a large number of users said excellent about the ease of use (63.6%), accessibility, speed and quickness (59% each) which are ranked first, second and third respectively. Even in case of other features, more than 40% of users expressed their opinion as excellent (Table 5.43).
43. The majority of respondents felt it as excellent reference with ease of use and timeliness (61.1% each) which is followed by speed and quickness (57.1%) and accessibility (50.8%). At the same time, a good number of respondents rated the features as good in respect of flexibility (51.6%), hypertext links (47.6%) and accessibility (44.4%). In view of smaller percent of faculty members uniqueness (44.4%), comprehensiveness (42.97%) and organized information (38.1%) features are poor (Table 5.44).

44. A large number of faculty members and scientists used library (54.8%) and both Internet and Library (43.8%) as a channel to access books. Scientific journals are accessed through a third option i.e. both Internet and library (50.4%) and followed by only Internet (31%). Researchers also observed that a large number of users accessed research/project reports (67.7%), abstracting and indexing journals (61.6%) and conference papers (53.2%) through Internet only. For reference sources, library was used as a channel to access dictionary and encyclopedia (64.4% each) and directories (55.5%) (Table 5.45).

6.3. Suggestions

6.3.1. Introduction

This study has identified the importance of information particularly in the field of marine sciences. The use of electronic resources and services by marine scientists differs from person to person. On analyzing the data in chapter-5, a number of findings and observations have been noticed in this investigation and some have been discussed in this chapter. The findings and observations necessitated the formulation of suggestions to enhance the capabilities of marine sciences and to optimize e-resources of marine science institutions, university departments and fishery college libraries.

6.3.2. Suggestions for Marine Science Institutions / Universities / Fishery College Libraries

Marine science education and research have drastically changed in their concept and character due to advances in marine science. These changes demand support from their respective libraries to collect, sort and recall the vide variety of information.
6.3.3. Use of library services

i). In this study, it has been found out that a few sources/services such as research reports, e-journals, e-books, online sources and services, web resources, and Internet sources and services are high ranked services as found from the library. Keeping in view of the importance of a variety of documentation and ICT enabled services, it is suggested that a selected marine science institutions/college libraries in south India, should provide such services.

ii). To promote the awareness of such services, librarians should conduct user education programs for promotion of availability of e-resources and services. It is also possible to conduct periodically user studies to find out the extent of non-utilization of library services. For marine science research, scientists depend on marine information data. It is suggested for storing the entire marine research data of the attached marine research institutions/ marine sciences departments of universities/ colleges in their respective libraries in an e-format, and makes it available through resource sharing to other marine research institution libraries for marine science guidance.

iii). It is found from this study that scientists/faculty members depend on information from e-resources published by marine research institutions for research. It is suggested to the marine research institutions to provide information regarding their research information to marine science institution libraries. It is suggested that marine science institutions/universities/ college libraries should secure, preserve and disseminate information provided by marine science institution to scientists / faculties.

iv). It is found from this study that marine science faculties/ scientists depend on informal information sources like discussions with colleagues, seminars/ conferences, means of communication and interactive meetings for marine science researches. It is suggested that institutions/universities/ college libraries which are electronic information resources and dissemination centers, should become a platform for informal information exchange. In this context, it is better if the library is renamed as electronic information resource center.
6.3.4. Collection Development

i). In this study, faculties/scientists expressed their needs for information resources for teaching and research. Therefore it is suggested that all departments of marine sciences/institutions/college libraries shall acquire secondary and tertiary sources of information in fisheries. If there are financial constraints in procuring these resources the best prescription is to have consortium of fishery college libraries for sharing of information resources.

ii). ICT has brought a revolutionary change in the field of oceanography, ocean technology, marine biology, aquaculture, fisheries science, fish microbiology, fish biotechnology etc. Keeping these changes, libraries of marine science institutions/colleges in South India shall strive for a better choice between print and electronic media of information resources. For optimum utilization or electronic information resources the acquisition policy of marine science institutions/college libraries should be need-oriented.

6.3.5. Electronic Libraries and Internet facilities

It is found in this study that the university departments of marine sciences and fisheries colleges are poor facilities of e-resources and services. Marine science research institutions are sponsoring the well equipped electronic libraries with Internet facilities. It is suggested that fishery colleges should seek the support of NRI (Non-Residential Indians) facilities/scientists of whom and old students of that college for sponsoring electronic libraries with better Internet facility.

6.3.6. Professional Development of the Library

Man-power plays a pivotal role in information managements keeping in view of the present man power in marine science research institutions. Colleges, it is suggested to initiate the following HRD programmes for the management of information services:

1. To initiate steps in filling up all the vacant posts in the library by suitable qualified persons.

2. Provision of orientation and refresher course programmes to the marine science institutions/college librarians to acquire more information handling techniques.

3. Encouraging librarians/information scientists for participating in international, national, regional seminars and workshops.
6.3.7. **Network Consortia Programme**

A network consortia programme will be successful so long as each participating library finds it beneficial to it. The attitude of participating libraries is important. It depends to a large extent on the willingness of the library staff to cooperate.

6.4. **Suggestions for further Research**

The investigator has identified the following topics for further research based on the present study.

1. Information needs and information seeking behavior of post graduate marine institutions/college students in south India.

2. Use of e-resources and services by oceanographers in south India.

3. Use of e-resources and services by marine biologists in India.

4. Design and development of marine information system for ocean technologists in south India.

5. Users' attitude towards the application of ICT in fishery colleges in India.

6. Comparative study on the use of e-resources and services between fishery colleges and ocean technology research institutions in India.


6.5. **Conclusion**

The study is on the use of e-resources and services by marine scientists in south India. The study emphasizes that the existing marine science research institution libraries, marine sciences departments of university libraries, fishery college libraries infrastructure in terms of collection, e-resources and services, online sources and services, Internet facilities are more to be strengthened. Fishery colleges are suffering from financial constraints and the limited man power resources under the provision of effective information services.
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The investigator stresses that the present libraries should accept the challenges being faced by ICT which would supplement and complement marine science libraries' users. The librarians should completely transform themselves with the changing scenario. Electronic resources will be fruitful only with balanced collection of information resources; provision of ICT based services in addition to the service offered by information professional.

The duties of faculties/ scientists in research centers and universities in south India are in these aspects of teaching, promoting as well as involving in research and finally safe guarding marine (organisms) animals, oceans atmosphere, earth quacks, and tsunami etc. by marine scientists treatment is really applaud able. In fulfillment of the desired functions, it is the responsibility of the librarians of the marine science research institutions/ universities/ colleges to support the faculties/ scientists duties with the required information sources for prospering healthy marine animals or ocean atmosphere.

The results of the study at marine science research institutions in south India suggest several trends that may have implications for research institutions:

- Electronic resources are popular and extensively used. Their popularity continues to increase with time.

- E-journals and e-books titles have already been related for print collections and continue to be used in their e-format. New journal titles in their online-only format, usually added to library collections in large quantity due to new acquisition strategies, also get used.

- Marine science research libraries can provide new and innovative document delivery services in an effort to better accommodate the needs of their marine scientists in electronic environment.