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Adoption of information technologies in medical libraries in Karnataka, India and Iran: A comparative study

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This study was carried out to investigate and compare the current state of information technology in medical libraries in Karnataka, India and Iran. Tools used for data collection included questionnaire, observational visits, and informal interviews with selected librarians. Although medical libraries in both countries have hardware, software, and communication facilities to some extent, they should strive to achieve excellent IT levels. A good number of libraries had library management software. However, only few medical libraries in both countries are fully automated. Iranian librarians ranked lack of institutional support, funds, trained and skilled professionals, and absence of planning and training courses, as the most important problems in IT application, while none of the options were rated as the most important problems militating against effective use of information technology by Indian medical librarians. The research compares the status of information technologies in India and Iran as developing countries and provides recommendations to promote library automation and effective application of information technology.

Key words: Medical libraries, information technologies, library automation, internet, India, Iran.

INTRODUCTION

Health development is a pre-requisite to socio-economic development. Over the past three decades, Iran has taken significant steps to improve the quality of health care delivery and medical education (Azizi, 2009). On the other hand in India, enormous efforts have been made for the development of medical education and health care. As a result, there have been rises in the number of medical, dentistry, and pharmacy colleges and in the numbers of student admissions in all programmes of medical sciences and teaching staff in both countries in recent decades. The increased number of users coupled with the growing challenges posed by exponential

proliferation of information caused medical libraries to adopt information and communication technologies for information input, storage, organization, processing, retrieval and dissemination.

Studies on information technologies in Iran indicate that computerization of library systems and services in Iran started in the late 1970s and resumed after an apparent gap in 1980s. However, this trend has accelerated in the last decade especially in institutions of higher education due to the increased number of users, greater demand for the use of library materials within and outside the libraries, increase in the amount of materials being published, changes in the nature of reading material and the development of new and cheaper computers (Safahieh and Asemi, 2010; Farajpahlou, 2002; Ramzan, 2004).

According to Moorthy (2000), many of the libraries and information centers in India started using computers for

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their works after the introduction of mini computers during the late 1970s. Since these were costly, only elite institutions in the public, academic, (Research and Development) R&D and private sectors could afford them and the libraries in these institutions were able to utilize them to some extent. Library automation, as a result did not progress satisfactorily. However, the arrival of microcomputers and personal computers (PCs) in the Indian market in the 1980s gave the necessary impetus; the environment began to change and library automation picked up momentum.

Academic medical libraries contribute to educational and research activities in many ways through exploiting IT and electronic information resources such as e-books; electronic/online journals; electronic databases and web-based services. Based on Haneefa's (2007) viewpoint, while libraries automate their library management activities and procure expensive electronic resources, they may not be optimally used. This is the main concern of libraries around the world. There are a lot of reasons for this state of affairs, like insufficient funds, inadequate infrastructure, lack of qualified library professionals and the like. In view of these facts, an attempt has been made here to study and compare the state-of-the-art information technology in medical libraries in Karnataka, India and Iran.

RELATED STUDIES

Sampath Kumar and Biradar (2010) examined the use of information communication technology (ICT) in 31 college libraries in Karnataka, India by investigating the ICT infrastructure, current status of library automation, barriers to implementation of library automation and also, librarians' attitudes towards the use of ICT. Findings revealed that the application of ICT in Indian college libraries had not reached a very high level. Lack of budget, manpower, skilled staff, and training were the constraints for not automating library activities. Mohsenzadeh and Isfandyari-Moghaddam (2009) performed a study to define the status of the application of information technology in academic libraries in Kerman, Iran. Results showed that the level of application of information technology in Kerman academic libraries was acceptable, but efforts should be made to improve their status to match with the ever-increasing demand for better library services at universities. The most important problem and serious difficulty was lack of educated librarians, which requires suitable investment and planning. Ramzan and Singh (2009) investigated the levels of information technology in academic libraries across Pakistan and found a low level of IT availability, especially the absence of computers, e-mail and internet. It was revealed that the respondent libraries needed to be

fully automated using standard library software. However, access to online resources was found to be extensive and comprehensive. Haneefa (2007) carried out a study to examine the application of information and communication technologies (ICT) in special libraries in Kerala, India. The results indicated that library automation in special libraries in Kerala was largely commenced during 1990-2000. CDS/ISIS was used more in libraries than any other software. The library catalogue was found to be the most popular area for automation. Most of the libraries were hampered by lack of funds, lack of infrastructure, and lack of skilled professionals to embark on automation of all library management activities and application of ICT. Matoria et al. (2007) pointed out that public libraries in India lagged behind others in the world in the provision of adequate facilities, automation of back-end operations, collection development and access, and in the use of ICT for housekeeping operations as well as for user services. They point out that this is partly due to the lack of willingness of library staff who are looking after the libraries; the non-supportive attitude of top management, inadequate funds from bodies such as the state and central governments; frequent changes in technology; and lack of demand for services from the library users. Nyamboga and Kemparaju (2002) examined the availability of different information technologies in six university libraries in Karnataka, India. They investigated the extent to which these technologies were being used in the delivery of and search for information. They found that university libraries in Karnataka still lagged behind some other Indian universities in the application of information technology, but the introduction of Internet access was considered an important step forward.

Hayati and Jowkar (2008) opine that the most problematic factors which slow down the adoption of electronic reference materials stem from unfamiliarity of academic librarians and users with computers and searching databases. They point out that the implementation of computers and information technology does not mean final acceptance and work productivity. Davarpanah (2003) in his study on university libraries in Iran reported that due to language barriers, an overwhelming number of these libraries had utilized commercial library-oriented packages developed in the country. The most widely used Iranian-made library software packages were, Pars Azarakhsh, Nosa, Kavosh and Ganjineh, respectively. University libraries associated with the Ministry of Health, Treatment and Medical Education relied on either Nosa or Pars Azarakhsh Software packages. The findings also indicated that 90.2% of libraries had computerized cataloguing systems. Khalid (2000) reports that the use of technology by university libraries can be increased by professional organizations and government agencies taking the

Table 1. Computers available in medical libraries.

Range	Indian colleges		Iranian colleges		Total colleges	
	No.	%	No.	%	No.	%
1-5	33	29.2	26	38.2	59	32.6
6-10	25	22.1	8	11.8	33	18.2
11-15	11	9.7	13	19.1	24	13.3
16-20	7	6.2	8	11.8	15	8.3
Over 20	37	32.7	13	19.1	50	27.6
Total	113	100.0	68	100.0	181	100.0

Table 2. Kinds of hardware available in medical libraries Indian and Iranian Colleges.

Kind of hardware Category	Indian colleges		Iranian colleges	
	n = 113	%	n = 68	%
Network server	106	93.8	64	94.11
Scanners	79	69.9	56	82.4
Barcode printers	50	44.2	52	76.5
Barcode Readers	49	43.4	42	61.8
CD-ROM towers/CD-ROM Servers	20	17.7	10	14.7
CD-ROMs	111	98.2	68	100

initiative. Among these, planning of technology, implementing information policy, developing broader awareness for the use of technology in libraries, establishing staff training and development and user education programs are particularly important.

OBJECTIVES OF THE STUDY

The purpose of the study was to examine the current application of information technological tools in medical libraries in Karnataka, India and Iran. However, the more specific objectives of the study are as follows:

1. To identify the status of information technology in medical libraries in India and Iran;
2. To compare the level of information technology status among medical libraries in India and Iran;
3. To identify problems militating against the effective usage of information technological tools in medical libraries in India and Iran.
4. To suggest measures for improvement of existing services and implementation of information technology.

RESEARCH METHODOLOGY

Based on a comprehensive literature review and in the light of the study objectives, a questionnaire was designed. The questionnaire

was administered to Chief Librarians with a cover letter indicating the significance of the study. The questionnaire was meant to collect data on the availability of information technological tools in medical libraries in Karnataka, India and all over Iran. In order to complement the quantitative information obtained by the questionnaires, informal interviews with librarians and personal visits to some libraries were also used.

This study was limited to libraries of medical, dental, and pharmacy colleges affiliated to Rajiv Gandhi University of Health Sciences (RGUHS), Karnataka, India and medical, dental and pharmacy colleges affiliated to the Ministry of Health and Medical Education (MOHME), Iran. Websites of RGUHS and MOHME were used to identify the names and addresses of libraries for the study. To collect primary data about IT application in medical libraries, the researcher identified 155 medical, dental, and pharmacy colleges in India, and 77 medical, dental, and pharmacy colleges in Iran. A total of 232 copies of questionnaires were distributed, through e-mail, mail and personal visits out of which 210 copies were returned with only 181 useable for analyses. This gave a 78% overall response rate. The collected data are presented in tables and diagrams while SPSS software and MS Excel were employed for data analyses.

RESEARCH RESULTS

It was deemed that computers, Internet, and library software were the basic tools for IT applications. Hence, respondents were requested to indicate the number of computers, CD-ROMs, and the availability of different hardware, software and Internet-based services.

Table 3. Types of software available in medical libraries.

Software	Indian colleges		Iranian colleges	
	n = 113	%	n = 68	%
Library management software	65	57.5	63	92.6
CD-Net management	24	21.2	6	8.8
DTP	111	98.2	68	100.0
DBMS/RDBMS	42	32.7	13	19.1
Dspace	2	1.8	-	-
Adobe Reader	110	97.3	68	100.0
Photoshop	77	68.1	46	67.6

Computers available in medical libraries

Respondents were asked to mention the number of computers available in their libraries. Table 1 indicates that more than one-third (26; 38.2%) of medical libraries in Iran and one-fourth (33; 29.2%) of Indian libraries had between 1 to 5 computers. The analysis also revealed that more than half of the libraries (92; 50.8%) in both countries had between 1 to 10 computers. Of 68 Iranian libraries, less than one-fifth (13; 19.1%) owned over 20 computers, whilst about one-third (37; 32.7%) of their Indian counterparts owned over 20 computers.

Kinds of hardware available in medical libraries

Respondents were asked to check the hardware available in their libraries. The analyses revealed (Table 2) that of 113 and 68 medical libraries in India and Iran, 106 (93.8%) and 64 (94.1%) had network servers, respectively, which is a key in establishing intranet and library remote services. Data analysis also revealed that a total of 69.9% of respondents from India and a total of 82.4% of respondents from Iran had digital scanners in their libraries. A total of 44.2% and 76.5% of respondents from India and Iran respectively had barcode printers, in their libraries.

More respondents from Iran (61.8%) used barcode readers for circulation than respondents from India (43.4%), and only few medical libraries in India 20 (17.7%) and Iran 10 (14.7%) had CD-ROM Tower/Server which provides access to CD-ROM databases and other CD-based information resources. Majority of medical libraries in India (111; 98.2%) and all medical libraries in Iran (68; 100%) used CD-ROM, a technology which is an important information technological tool for information storage and retrieval. More than half (91; 50.3%) of the medical libraries reported the need to have more computer terminals and devices like printers and scanners to provide electronic information resources and services.

Types of software available in medical libraries

The mere availability of hardware facilities is not sufficient, unless they are put into activation via appropriate and sufficient software packages to render up-to-date information services. Respondents were asked to indicate the kinds of software available in their libraries. As Table 3 shows more than half 65 (57.5%) of Indian medical libraries and majority 63 (92.6%) of Iranian medical libraries owned library management software. Few libraries 30 (16.6%) had CD-Net management software, out of which 24 (21.2%) belonged to Indian medical libraries and 6 (8.8%) to Iranian medical libraries. Majority of the medical libraries (179; 99%) had DTP (Desk top publishing), a software like MS Office in their libraries. Less than half (55; 30.4%) of medical libraries had DBMS/RDBMS. Majority of libraries (178; 98.3%) had Adobe Acrobat Reader and a sizeable number (123; 68%) of them had Photoshop. Few of the respondents had other software packages like Dspace which is an open-source software for creating institutional repository, and Nero for burning CD/DVD.

Library management software

Library management software is crucial for the success of library automation. Responses indicated that the medical libraries surveyed used a wealth of different software packages. Findings showed that libraries were more interested in commercial software packages. There were 7 and 5 software packages preferred by medical libraries in India and Iran, respectively. Of the 68 libraries responding from Iran, 63 (92.7%) indicated to have computerized their operations. Medical libraries in India that have automated their operations numbered 65 (57.5%). The analysis also revealed that 50 (79.4%) out of the 63 medical libraries in Iran used Pars Azaraksh Software package and the rest of them used other software packages including Nosa, Koha, Maktoob,

Table 4. Automation of medical libraries operations.

Operation	Indian colleges		Iranian colleges	
	n = 65	%	n = 63	%
Acquisition	42	64.2	23	36.5
Cataloguing	45	69.2	62	98.4
Circulation	48	73.8	54	85.7
Serial control	42	47.7	27	42.9
OPAC	30	46.2	38	60.3
All operations	22	33.8	9	14.3

Table 5. Medical libraries' Internet-based Services.

Service	Indian colleges		Iranian colleges	
	n = 113	%	n = 68	%
Acquisition	53	50.0	38	55.9
Cataloguing	48	45.3	59	86.8
Classification	38	35.8	58	85.3
Bibliographic databases searching	62	58.5	52	76.5
Interlibrary loan	30	28.3	11	16.2
Online reference services	33	31.1	27	39.7
Online tutorial	17	16.0	26	38.2
Online classes	12	10.6	12	17.6
Blogs	14	12.4	9	13.2
RSS	6	5.3	7	10.3
Auto alerts	6	5.3	9	13.2

Payam-e-Mashreque and in-house prepared software respectively. In India also, EasyLib software was used more in libraries (30.8%) than any other commercial software. LIBSOFT was the distant second software with 10 (15.4%) libraries. 13 medical libraries (19.1%) responding from India reported that had developed the library management software in-house.

The other software packages used by medical libraries in India were Libsys, SOUL, NewGenLib, Library Management System, and Kingdom Library System. 2 (3.1%) medical libraries from India declined to answer this question.

Library automation

The status of library automation of medical libraries is presented in Table 4. As the table demonstrates, of 65 Indian libraries with automated services, 42 (64.6%), and of 63 Iranian medical libraries with computerized services, 23 (36.5%) had automated acquisition work. Hence, it may be concluded that although a good number of medical libraries in Iran had library management software, majority of them were doing acquisition work

manually. The library catalogue was found to be the most popular area for automation among medical libraries in Iran with 98.4% (62) of libraries having automated cataloguing while, among medical libraries in India cataloguing is the distant second to circulation with 45 (69.2%) libraries with automated cataloguing. It was found that 48 (73.8%) medical libraries from India and 54 (85.7%) from Iran had computerized circulation systems. It was found that only 31 (47.7%) medical libraries from India and 27 (42.9%) from Iran had automated serial control. As shown in Table 4, 30 (46.2%) medical libraries in India and 38 (60.3%) in Iran had OPACs. More than half of the libraries from India, with automated operations, had no OPAC. 22 (33.8%) medical Libraries in India and 9 (14.3%) in Iran were fully automated and the remainder, (43 and 54 libraries from India and Iran respectively), were partially automated.

Use of electronic information resources

The use of electronic information resources has been prevalent in all sorts of libraries including medical libraries due to the unprecedented growth of information,

Table 6. Problems in IT applications in medical libraries.

Constraint	Indian colleges		Iranian colleges	
	Mean	Rank	Mean	Rank
Lack of trained and skilled professionals	2.348	1	3.191	3
Lack of professional commitment	2.342	2	2.676	5
Lack of funds	2.265	3	3.323	2
Lack of institutional support	2.232	4	3.382	1
Lack of standards	2.220	5	2.985	4
Absence of planning	2.091	6	3.191	3
Negative attitudes towards automation	1.866	7	2.412	6
Unsatisfactory library software	1.718	8	2.985	4

widespread use of computer networks and emergence of the Internet. The use of e-resources in medical libraries in India and Iran are thus presented under.

Internet accessibility and Internet-based services

The Internet has become widely used in promoting the collection, building and improvement of library and information services. Data analyses revealed that all the institutions under study had access to the Internet either in the library (109; 60.2%) or in the information center (35; 19.3%), or in both of them (37; 20.4%). As shown in Table 5, half (53; 50.0%) of medical libraries in India and more than half (38; 55.9%) in Iran were using Internet for acquisition work. Internet was used for cataloguing by 48 (45.3%), and 59 (86.8%) of medical libraries from India and Iran, respectively. While 58 (85.3%) of medical libraries from Iran were using Internet for classification, only 38 (35.8%) of their counterparts from India search the Internet for classification work. Majority of medical libraries from Iran (52; 76.5%) were using the Internet for retrieving bibliographic information as opposed to 62 (58.5%) medical libraries in India. While 30 (28.3%) medical libraries from India use the Internet for inter-library loan, only a few (11; 16.2%) from Iran use it for such purposes. 33 (31.1%) medical libraries from India and 27 (39.7%) from Iran use the Internet for online reference services. 26 (38.2%) of medical libraries in Iran use the Internet for online tutorial as opposed to 17 (16.0%) medical libraries in India. Very few medical libraries in India (10.4, 12.4, 5.3 and 5.3%) and in Iran (17.6, 13.2, 10.3 and 13.2%) use the Internet for online classes, blogs, RSS, and auto alerts respectively. Of 181 responding medical libraries from both countries, few had an independent website (8; 4.4%) and majority had a link (109; 60.2%) in the parent institute homepage, and more than one-third (64; 35.4%) had neither a website nor a link in the parent institute homepage.

Electronic/online journals

Electronic/online journals are widely used in medical libraries. The analyses showed that the majority of medical libraries (158; 87.3%) under study provide access to electronic journals in their libraries viz; 98 (86.7%) and 48 (70.6%) in India and Iran, respectively. However, 15 medical libraries in India and 20 medical libraries in Iran did not provide access to e-journals within the library, representing 13.3 and 29.4%, respectively. Since providing access to e-journals is mandatory for medical libraries in both countries, this finding may be due to the fact that these information resources are made available by either computer laboratories or in the Iranian case, by central libraries that exist in each university of medical sciences.

Digital libraries

Data analysis revealed that only few (28; 24.8%) medical libraries in India and Iran (11; 16.2%) had a separate digital library, the main components of which were electronic databases, full-text e-journals, publications of the institute research community, e-books, discussion groups, online news, CD-ROM databases, and in-house databases.

Library consortium

Library consortium is established to improve information resources and services and to obtain financial benefits. The data analyses revealed that the majority (93; 93.9%) of medical libraries in India are members of HELINET consortium, and few (6; 6.1%) were participating INDEST, DELNET, and INFONET consortia. In addition to HELINET, 14 (12.4%) declined a response to this query. Analyses also revealed that majority (66; 97.1%)

of medical libraries in Iran were participating INML (Iranian National Medical Library) consortium, 2 (2.9%) ignored this question.

CONSTRAINTS TO SUCCESSFUL APPLICATION OF ICT

Respondents were asked to list in priority the problems they were facing in implementing and increasing the use of information technology in the respective libraries. They were provided with 8 options on a Likert Scale of 1 (not at all important) to 4 (to a great extent important) to indicate their response. Since there were 4 scales, the codes assigned to these scales were from one to four. Thus, the calculated mean for these options was 2.5. Therefore, the options having a mean score of more than 2.5 can be considered as the most important problems of ICT application. Table 6 indicates that Iranian librarians ranked lack of institutional support, lack of funds, lack of trained and skilled professionals, and absence of planning and training courses, as the most important problems in IT application, while none of the options were rated as the most important problems militating against effective use of information technology by Indian Medical Librarians.

DISCUSSION

This investigation was carried out to examine the status of the application of information technology in Indian and Iranian medical libraries and to identify the problems militating against the effective use of IT application in these libraries. The outcomes of the study revealed that more Iranian medical libraries had barcode printers than their Indian counterparts; more respondents from Iran used barcode readers for circulation than respondents from India and; the majority of medical librarians in India indicated that their hardware facilities were adequate, whereas just less than half of medical librarians in Iran were satisfied with their hardware facilities. This finding is comparable to that from a study by Haneefa (2007).

Although, majority of medical libraries in both countries used CD-ROM technology, which is an important information technological tool for information storage and retrieval, few respondents from both countries owned CD-ROM Tower/Server and CD-Net Management Software, which provide access to CD-ROM databases and other CD-based information resources.

More medical libraries in Iran owned library management software than Indian medical libraries hence, more Iranian libraries had computerized operations than Indian libraries. Majority of Iranian medical libraries used Pars Azarakhsh Library

Management Software; this is in accordance with the result of a study by Davarpanah (2003). In India EasyLib Software was used in more libraries than any other commercial software and this is similar to the results reported by Sampath Kumar and Biradar (2010). However, only few medical libraries in both countries were fully automated. This is similar to the results reported by Ramzan and Singh (2009) and Sampath Kumar and Biradar (2010) which show low levels of automation in college libraries. Library catalogue was found to be the most popular area for automation among medical libraries in Iran and this is comparable to the results reported by Davarpanah (2003). Hence, more Iranian medical libraries had OPACs than their Indian counterparts. Cataloguing is a distant second in circulation among medical libraries in India.

The majority of libraries under study owned network servers, which is a key in establishing intranet and library remote services. Although, all institutions under study had access to the Internet, the use of the Internet for library operations and information services was found to be less in the areas of online classes, RSS, autoalert and reference services among medical libraries in both countries. More Iranian medical libraries were using the Internet for acquisition work, cataloguing and classification than their Indian counterparts while more Indian medical libraries were using the Internet for interlibrary loan than their Iranian counterparts. These findings are in accordance with results reported by Davarpanah (2003) who attributed these to the lack of network utilities and established national library networks. Very few medical libraries in both countries had independent websites, a finding confirmed in reports by Ramzan and Singh (2009) and Haneefa (2007).

Since providing access to e-journals is mandatory for medical libraries in both countries, majority of medical libraries provided access to e-journals and almost all medical libraries were members of library consortia. Majority of libraries in both countries had no digital library or digital library initiatives. This is similar to results reported by Ramzan and Singh (2009) and Haneefa (2007).

Iranian librarians ranked lack of institutional support, lack of funds, lack of trained and skilled professionals, and absence of planning and training courses, as the most important problems in IT application, while none of these options were rated as the most important problems hindering effective use of information technology by Indian Medical Librarians. Regarding lack of institutional support, Sampath Kumar and Biradar (2010) point out that 'despite widespread awareness about the importance of libraries, college libraries often remain the most disregarded division in colleges'.

Regarding lack of qualified staff, lack of funds, and lack of training courses, the findings show similarities with Haneefa (2007), Hayati and Jowkar (2008), Kargbo

(2002), Sampath Kumar and Biradar (2010) and Mohsenzadeh and Isfandyari-Moghaddam (2009). Kargbo (2002) argues that the financial position of most academic libraries is uncertain; most of these institutions are funded on the basis of percentage of the institutional expenditure.

Conclusion

In an era of medical information explosion and increasing use of digital information resources, the application of information technology in medical libraries has become inevitable. Medical libraries perform their operations and services more efficiently, through effective application of information technology. This investigation provided a useful summary of the application of IT in Medical libraries in Karnataka, India and Iran. Most medical libraries were striving to provide IT-based library resources and operations. However, more than half of them reported the need to have more computer terminals and devices like printers and scanners to provide electronic information resources and services. It can be concluded that although medical libraries in both countries had hardware, software, and communication facilities to some extent, they should strive to adjust to the ever-growing demands for optimal library and information services. They also need to give priority to staff training with regard to IT-based services and resources.

Recommendations

Based on the findings and conclusions, some recommendations for optimizing the present situation are made as follows:

1. Since libraries cannot function appropriately without ICT infrastructure, it is suggested that computers, printers, library software and different types of electronic information resources be provided to enhance quality library operations and information services.
2. Library automation is considered as the most important part of IT application in libraries, which will help better services to clients. Therefore, automation of all library operations should be carried out as this will enhance library services and resource sharing at national and international levels.
3. It is essential for medical libraries to initiate training programs for library staff in collaboration with campus computer centers, departments of studies in library and information science, and medical library associations in both countries.
4. It is important for medical librarians to design library

websites to provide links to their electronic/online resources and web/internet- based services.

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