Emerging Technological Trends in Library Management and Services during Covid-19 pandemic

Divina Rosiline D'silva
Research Scholar,
Department of Library and Information Science,
Manonmaniam Sundaranar University,
Tirunelveli-627 012, Tamil Nadu, India.
Email: divinarosa31@gmail.com

P. Balasubramanian
University Librarian & Head,
Department of Library and Information Science,
Manonmaniam Sundaranar University,
Tirunelveli-627 012, Tamil Nadu, India.
Email: bala_phd2010@yahoo.com

Abstract

Technological advancement has brought tremendous changes in Library and Information Services. Applications of new technologies in libraries have resulted in a meaningful and substantive change in libraries, their collections, services and methods of delivery of services. The concept and practice of providing remote access to e-resources by libraries are not new. Still, the user-friendly way adopted by many libraries and the number of resources made available by them during the pandemic is exemplary. The Library's collection will change, becoming more interactive and remotely accessible. This paper attempt to analyse the user's Perception of the library services provided by the Manonmaniam Sundaranar University Library global and trending technologies for Library and Information Science.

Keywords

Technology Trends; Libraries; Library Professionals; Library Management; UGC Initiatives; Library Services and Covid-19.

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Introduction

As we all know, Covid-19 is spreading worldwide without differentiation of countries, communities, skin and colours etc. In this situation, all the libraries and professionals struggle to provide timely information to all users, especially those sheltered in their homes and satisfy users' needs. Libraries offer equal opportunities to access free data to all users. The web-based services such as remote access, design website, subscription of e-resources, ask librarian, frequently ask questions, live chats, streaming interactions, user assistance, virtual information literacy, online document delivery services, virtual bulletin services, email alerts, online newspaper clipping, interlibrary loan services and other web-based services have given support to libraries provide the information to the user communities. In response to the covid-19 pandemic, all educational institutions are closing their campuses and students, and teachers are forced to transition to an online environment. As a result, libraries have been exploring the collection of potential e-resources and providing remote access to those which may be of interest to the fraternity in support of academic and research activities.

Objectives of the Study

1. To find out innovative ways to reach out to library users
2. To explore the mode of dissemination of services during this period
3. To enhance the UGC initiatives during this period
4. To analyse user's satisfaction about the dissemination of services during covid'19
5. To offer suitable suggestions for Innovative Technologies that can be used in the libraries.

Related Studies

Several studies have been conducted on the topic of emerging technological trends in libraries. In the light of this topic, a survey of the available literature is made here to make the study more strengthened and widen. **Pooja P. Dadhe and Manju N. Dubey** (Nov-2020); carried out a survey of Library Services Provided during COVID-19 Pandemic: Content Analysis of website of Premier Technological Institutions of India. This paper gives a brief idea about the sudden and unexpected virus outbreak that forced the library professionals to ascertain ways of working in a rapid time frame, like shifting to digital

platforms wherever possible and providing adequate remote services to the users. The study explores the type of services provided by libraries of Indian Institutes of Technology (IITs) based on the contents published on their webpages, **Funmilayo RachealAyo-Olafare**(Jan -2020); in the study on Global Trends and Emerging Technologies in Libraries and Information Science. Mainly focused on this paper is to identify the global and trending issues as well as emerging technologies for Library and information science so that readers can specifically focus on them for effective library services such as Instant Messaging, RSS Feeds, HTML Feeds, Streaming Media, Podcasting, Vodcasting, SMS Enquiry Service, Blogs, Wikis, Social Networks, Tagging, Social Bookmarking Services. **Rhoda Bharucha** (2008), in the book Current Trends in Libraries in the Digital Era, explained in detail the new technology that can be used in libraries in the Digital Era.

Library Services

The ultimate goal of the Library is to provide services to the users. With the advancement of ICT, there have been a lot of changes in the concept of traditional library service. Nowadays, most of the libraries have been highlighted mainly on providing access to diverse digital information resources. With the advent of the internet, libraries have brought tremendous changes in The services offered by the Library include;

- Digital library services
- Personalised services
- Web-based reference and information services
- Search Engine Services
- Co-operative Digital Library Services
- Digital Reference Services of Academic Libraries

Innovative Technologies to implement at the Library

Today, Libraries and Library Professionals are continuously involved in introducing technology-oriented services such as RFID Technologies, Cloud Computing, 3-D Printing, Artificial Intelligence, etc., in meeting the user community's needs. The study discusses the major technology trends in library services. The primary technology trends are listed below.

Block chain

It is a chain of blocks or a list of linked records by using cryptography. The concept of Block chain was introduced in 2008 proposed by Satoshi Nakamoto to create a purely peer-to-peer version of electronic cash which would become the digital bitcoin currency in 2009.

Applications of Block chain in Library

- To build a metadata system for libraries
- To protect digital first sale right
- To connect the network of libraries
- To host digital peer to peer sharing
- To share partnership across organisations.

Cloud Computing

Information Technology plays a vital role in handling library resources management. Libraries are shifting their services with the attachment of the cloud with the facilities to access anytime, anywhere. Cloud computing offers many exciting possibilities for libraries that may help to increase performance for some technology activities. With the help of this technology, library staff will be free from managing the servers. It is commonly seen that it is difficult for library professionals to work with the technologies. Cloud computing technology can be of immense importance in helping libraries undertake library activities' automation.

Artificial intelligence

Computers provide the perfect medium for the experimentation and application of Artificial Intelligence technology in the present Era. Artificial Intelligence has more success at intellectual tasks such as computer-based game playing and theorem proving than perceptual tasks. Sometimes, these computer programs are intended to stimulate human behaviour and are built for technological applications, such as Computer-aided instruction. In many cases, the main goal is to find any technique that does the task quickly in a better way.

Type of Library Services Provided during Pandemic:

During this pandemic time, services of Library has expanded a lot, facing the challenges and difficulties of keeping social distances and following the Government rules and norms

- **Remote Access to E-resources**

E-resources have paved a way to enhance educational standards, especially during this pandemic. Many Universities and Colleges have widened their E-resources to access remote areas, especially outside the Campus of the educational institutions.

- **Free and Expanded Access**

In response to the uncertain and challenging time, some publishers are providing expanded access to e-resources (access to additional materials than subscribed by the Library), including e-books, e-journals, e-databases, etc., limited period of this pandemic.

- **Open Access Resources**

Beyond this, there are many scholarly freely available resources available, notably National Digital Library of India (NDLI), Shodhganga, a repository of Electronic Thesis and Dissertation, Directory of Open Access Journals (DOAJ), AMS Free Online Books, Book Boon, Directory of Open Access Books (DOAB) and many more.

- **Tools and Techniques**

Web 2.0 technologies can help libraries create collaborative and participative environments, especially during this pandemic time to deliver user-centric library services and develop new resources. Availability of technologies gives libraries the ability to offer improved, customer-driven services to their users. Tools and techniques used for evolving Library 2.0 environment

- **Synchronous Communication**

➢ **Instant messaging,** or I.M., is a form of real-time, virtually instantaneous communication between two or more people using the textual format. Libraries are already deploying I.M. for providing "real-time reference" services, where patrons can synchronously communicate with librarians much as they would in a face-to-face reference context.

- **Content Delivery**

➢ **RSS Feeds**- RSS stands for Really Simple Syndication or Rich Site Summary. The technology, on the one hand, allows a website (or e-publisher) to list the newest published updates (like the table of contents of journals, recent articles) through a technology called XML; on the other hand, it facilitates a web user to keep track of new updates on the chosen website (s). Like a personal search assistant, RSS feed readers visit pre-defined websites, look for updated information and fetch it automatically onto the user's desktop. It provides users with a way to syndicate and republishes the Web's content. Libraries are already creating RSS feeds for users to subscribe to, including updates on new items in a collection, new services, and new content in subscription databases.

- **Podcasting**

Podcasting is defined as the "process of capturing audio digital-media files that can be distributed over the internet using RSS feeds for playing-back on portable media players as well as computers. Users can subscribe to such feeds and automatically download these files directly into an audio management program on their P.C.s. Several libraries use podcasts to support library orientations programmes.

- **Vodcasting**

The "VOD" in Vodcasting stands for "video-on-demand". A step beyond podcasting, vodcasting, also called video podcasting or vlogging, adds video to the downloadable sound files podcast listeners are used to. Downloading the video files is a simple matter of subscribing to a podcast in one of the many freely available directory programs. Libraries use vodcasts to illustrate what the Library has done and attract the community to future programs. The vodcast enhances the lecturer-student interaction by allowing the relationship to go beyond the classroom in a more time-efficient manner, reducing the need for face-to-face consultation (Sutton-Brady 2009)

- **SMS Enquiry Service**

Short Message Service (SMS) is a delivery mechanism of short messages over mobile networks. The SMS enquiry services in a library allow patrons to use their mobile phones to SMS their inquiries to the Library. The reference staff deployed to attend to such queries can respond immediately with answers or links to more in-depth explanations.

- **Publishing Tools**

➢ **Blogs**

Blogs are considered lightweight publishing tools. Blogs provide control to an individual or group of individuals for publishing content or making commentary on it. Technologically, blogs are easier to use, platform-independent, and accessible online over the internet. Broadly, blogs can be online dairies. However, experts in different subject areas maintain thousands of blogs who are willing to share their knowledge, understanding, and opinions with other people. The most apparent application of blogs for libraries is to use them as a tool for promotion, publicity and outreach services. Libraries can disseminate information to their users; make announcements for their new resources and events through their blogs. Blogs can be used to initiate debates and interactions amongst users and staff. Moreover, library staff and users can be encouraged to use Library blogs to get to know each other and interact personally.

➢ **Wikis**

Libraries can use the wiki as a communication tool to enable social interaction among librarians and patrons. Users can share information ask and answer questions, and librarians can do the same within a wiki. Moreover, a record of these transactions can be archived for perpetuity. Transcripts of such question-answer sessions would serve as a resource for the Library to provide as reference.

UGC Initiatives during COVID-19

During the lockdown time, the UGC has taken initiatives to strengthen the academic community of our country. All the resources are available in the digital platforms that can be accessed by teachers, students and researchers in various colleges and universities for widening their areas of learning.

1. **SWAYAM online courses:**
   SWAYAM is India's national MOOC platform. It offers over 2,150 *courses* taught by close to 1,300 instructors from over 135 Indian universities.
2. **UG/PG MOOCs:**
   The University Grants Commission has announced new Massive Open Online Courses, MOOCs, for its SWAYAM platform for July 2021. UGC has announced 83 undergraduate and 40 postgraduate, Non-Engineering online courses for its July-October session 2021.
3. **e-PG Pathshala:**
   e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC. The content and its quality is the critical component of the education system, high quality, curriculum-based, interactive e-content in 70 subjects across all disciplines of social sciences, arts, fine arts and humanities, natural & mathematical sciences, linguistics and languages have been developed by the subject experts working in Indian universities and other R & D institutes across the country. Every subject had a principal investigator, paper coordinators, content writers, content reviewers, Language editors and multimedia sections.
4. **e-Content courseware in U.G. subjects:**
   E-content in 87 Undergraduate Courses with about 24,110 e-content modules is available on the CEC Website.
5. **SWAYAMPRABHA:**
   SWAYAMPRABHA is a group of 32 DTH channels providing high quality educational curriculum-based course contents covering diverse disciplines such as arts, science, commerce, performing arts, social sciences and humanities subjects, engineering, technology, law, medicine, agriculture etc. to all teachers, students and citizens across the country interested in lifelong learning.
6. **CEC-UGC YouTube channel:**
   It provides access to unlimited educational curriculum based lectures free.
7. **National Digital Library:**
   NDL is a digital repository of a vast amount of academic content in different formats. It provides interface support for leading Indian languages for all academic levels, including researchers and life-long learners, all disciplines, all popular forms of access devices and differently-abled learners.
8. **Shodhganga:**
   Shodhganga is a digital repository platform of 3,33,333 (as of 31st December 2021) Indian Electronic Thesis and Dissertations for research students to deposit their PhD thesis and make it available to the entire scholarly community in open access.
9. **e-Shodh Sindhu:**
   e-Shodh Sindhu provides current as well as archival access to more than 15,000 core and peer-reviewed journals and several bibliographic, citation and factual databases in different disciplines from a large number of publishers and aggregators to its member institutions, including centrally-funded technical institutions, universities, and colleges that are covered under 12(B) and 2(f) Sections of the UGC Act.
10. **Vidwan**
    Vidwan is a database of experts that provides information about experts to peers, prospective collaborators, funding agencies, policymakers, and research scholars. Faculty members are requested to register on the Vidwan portal to help expand the database of experts.

Methodology

The sample frame of the study is members of the Manonmaniam Sundaranar University Library, Tirunelveli. The researcher constructed a vital questionnaire in the **google form** based on previous studies and consulted with field experts. The

researcher discussed with the authorities of Manonmaniam Sundaranar University library about its importance and got permission along with the selected list of members with their WhatsApp number who are currently members of the Library. The researcher sent the google form link to 250 members and received 190 fully completed forms. The response rate is 76 per cent.

Limitations

- ⇒ . The researcher pursued a simple random sampling technique to collect the data from the respondents.
- ⇒ The outcome of the present study is related to the Manonmaniam Sundaranar University Library, Tirunelveli.

Analysis and Interpretation of data:

Table 1: Type of the Respondents

Sl.No	Type of the Respondents	No. of Respondents	Percentage
1	Faculty	46	24.21
2	P.G Students	83	43.68
3	Research scholars	61	32.11
	Total	**190**	**190**

(Source: Primary data)

The above table depicts the classification of the respondents based on the type of user. i.e. faculty, P.G students and research scholar. It is found that 43.68 per cent of the respondents are postgraduate students, 32.11 of them are research scholars, and only 24.21 per cent are faculty.

Table 2: Age of the Respondents

Sl.No	Age of the Respondents	No. of Respondents	Percentage
1	Below 25 years	83	43.68
2	25 – 40 Years	65	34.21
3	Above 40 years	42	22.11
	Total	**190**	**190**

Table 2 reveals the age-wise classification of the respondents. It is found that 43.68 respondents have come under the age category of below 25 years, 34.21 per cent 25 – 40 years, and 22.11 per cent of the respondents have belonged to the age group above 40 years.

Table 3: Hours spend in the Library

Sl.No	Hours spend in the Library	No. of Respondents	Percentage
1	Less than half an hour	62	32.63
2	Half an hour to one hour	84	44.21
3	More than one hour	44	23.16
	Total	**190**	**190**

From table 3, it is observed that a maximum of 44.21 per cent of respondents spends half an hour to one hour, followed by 32.63 per cent of them spending less than half an hour and 23.16 per cent of respondents spend more than one hour in the Library.

Table 3: Purpose of Visiting Library

Sl.No	Purpose of Visiting Library	No. of Respondents	Percentage
1	Read Books / Magazines	28	14.74
2	Newspaper reading	41	21.58
3	Preparing a course assignment	65	34.21
4	Preparing notes	34	17.89
5	To know the Social Activities	22	11.58
	Total	**190**	**190**

It is understood that 34.21 per cent of respondents visit the Library for "Preparing a course assignment" followed by Newspaper reading, preparing notes, reading books/magazines, and knowing the Social Activities.

Table 4:CFA – Respondents perception about the services

Sl.No	Respondents' Perception about the services	Code
1.	Remote Access to E-resources	**P1**
2.	Free and Expanded Access	**P2**
3.	Open Access Resources	**P3**
4.	Tools and Techniques	**P4**
5.	Content Delivery	**P5**
6.	Podcasting	**P6**
7.	video-on-demand	**P7**

8.	SMS Enquiry Service	**P8**
9.	Publishing Tools	**P9**
10	Library staff approaches	**P10**

Fig 1

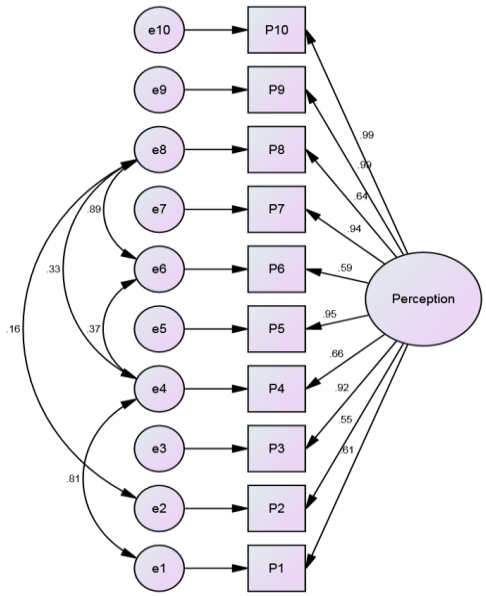


Table 5: Model fit summary of Structural Equation Model

Indices	Value	Suggested Value
Chi-Square value	134.61	--
Degrees of Freedom	35	--
Chi-Square value / Df	3.846	< 5.00 (Hair et al., 1998)
P Value	1.879	> 0.05 (Hair et al., 1998)
GFI	0.962	> 0.90 (Hu and Bentler, 1999)
AGFI	0.928	> 0.90 (Hair et al., 2006)
NFI	0.933	> 0.90 (Hu and Bentler, 1999)
CFI	0.947	> 0.90 (Daire et al., 2008)
RMSEA	0.068	< 0.08 (Hair et al., 2006)

Table 5 discloses the model fit summary of variables selected under the hypothesis " Respondents perception about the services of Manonmaniam Sundaranar University Library ". The calculated P-value is 1.879, more than 0.05, which shows a faultless model fit. GFI (Goodness of Fit Index) value 0.962 and AGFI (Adjusted Goodness of Fit Index) value 0.928 more than the threshold level, representing a good model fit. The calculated CFI (Comparative Fit Index) value is 0.947, a continuous fit. It is also found that the RMSEA (Root Mean Square Error of Approximation) value is 0.068, which shows it is a perfect fit model. Hence Null hypothesis is accepted and states that the proposed model fits further analysis.

Table 6
Standardised Regression Weights

Dependent Variables	Relation ship	Independent Variable	Estimate	Item Reliabilities	Standardised error Variance
P1	<---	**Respondents Perception about the services**	.611	0.373	0.627
P2	<---		.549	0.301	0.699
P3	<---		.916	0.839	0.161
P4	<---		.664	0.441	0.559
P5	<---		.954	0.910	0.090
P6	<---		.589	0.347	0.653
P7	<---		.939	0.882	0.118
P8	<---		.643	0.413	0.587
P9	<---		.994	0.988	0.012
			CR **0.902	6.475/10*100 = **AVE ** 64.75**	

Confirmatory factor analysis was implemented with the ten variables to clarify the Respondents' Perception about Manonmaniam Sundaranar University Library services. Factor Loadings/ Regression weights of the Variables under the construct " Respondents perception about the library services "were highly significant, and the items had soundly suitable loadings. The CFA analysis reveals that standardised factor loading fluctuates from 0.589 to 0.994. The variables itemised above' measured their reliability through the Cronbach alpha (0.6923). It is greater than the threshold value of 0.50 and advocates that all the variables can measure the "customer-related causes for the stress.". The average variance explained was 64.75. The rule of thumb of AVE is 0.50 or higher points with adequate convergent validity. The construct reliability is 0.902. The rule of thumb for a construct reliability estimate is that .7 or higher suggests good reliability.

Table 7 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.781[a]	.611	.601	.65297

"R" stipulates the multiple correlations between dependent variable Respondents satisfaction about the services and independent variable " Respondents perception about the benefits of Manonmaniam Sundaranar University Library ". A value higher than 0.6 is suitable for further analysis. In this case, the value is 0.781, which is noble. R-square specifies the total change for the dependent variable that the independent variables could explain. A value of more than 0.5 displays that the model is dynamic enough to define the relationship. In this case, the value is .611, which is admirable. Adjusted R-square shows the simplification of the results. It is requisite to have a difference between R-square, and Adjusted R-square should be smallest. The value is .601, which is not far off from .611, also good. Therefore, the model summary is suitable to follow with the next step.

Table 8: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	260.143	10	26.014	61.013	.000[b]
	Residual	165.857	179	.426		
	Total	426.000	189			

P-value/ Sig value commonly, the researcher picks a 95 per cent or 99 per cent confidence level. The above table established that the p-value is less than 0.01. Therefore, the result is significant. F-ratio signifies an improvement in the prediction of the variable by fitting the model after considering the imprecision present in the model. A value is greater than 3 for F-ratio yield efficient model. In the above table, the value is 61.013, which is good. These results estimate that as the p-value of the ANOVA table is below the tolerable significance level, thus there is a possibility of rejecting the null hypothesis in further analysis.

Table 9: Inferential Statistic

Variables	(B)	Std. Error of B	(Beta)	t value	P value
Constant	.657	.190	-	3.453	.001
Remote Access to E-resources	.251	.042	.260	5.989	.000***
Free and Expanded Access	.285	.044	.313	6.422	.000***
Open Access Resources	.181	.043	.212	4.230	.000***
Tools and Techniques	**.028**	**.050**	**.029**	**.557**	**.578***
Content Delivery	.337	.052	.306	6.422	.000***
Podcasting	.373	.044	.397	8.558	.000***
video-on-demand	**.005**	**.050**	**.005**	**.092**	**.926***
SMS Enquiry Service	.192	.050	.169	3.848	.000***
Publishing Tools	.243	.057	.208	4.230	.000***
Library staff approaches	.425	.050	.399	8.558	.000***

**Significant at 5 per cent level
*** Significant at 1 per cent level
* Not Significant at 5 per cent level

Table 9 pictures how the independent variable Respondents perception about the services of Manonmaniam Sundaranar University Library " influence the dependent variable "satisfaction of the respondents" selected for the study. It is found that eight out of ten variables influence the dependent variable " satisfaction of the respondents of respondents". Since the "t" value of eight independent variables are more significant than the critical value of 1.96. The equivalent "p" value is less than 0.01 at 99 per cent level of the confidence. Hence, eight out of ten variables in the construct " Respondents perception about the services of Manonmaniam Sundaranar University Library influence the respondents' satisfaction. Besides, the variables "video-on-demand" and Tools and Techniques do not influence the respondents' satisfaction with the Library services.

Findings:

→ The study revealed that 43.68 per cent of the respondents are postgraduate students, 32.11

of them are research scholars, and only 24.21 per cent are faculty.

→ It is found that 43.68 respondents have come under the age category of below 25 years, 34.21 per cent 25 – 40 years, and 22.11 per cent of the respondents have belonged to the age group above 40 years.

→ The researcher understood that 34.21 per cent of respondents visit the Library for "Preparing a course assignment" followed by Newspaper reading, preparing notes, reading books/magazines, and knowing the Social Activities.

→ The Manonmaniam Sundaranar University library users have favourable Perceptions of the services.

→ The study revealed that eight out of ten variables influence the respondents' satisfaction, and the variables "video-on-demand" and Tools and Techniques do not influence the respondents' satisfaction with the Library services.

Suggestions:

↗ The tools and techniques used in the Manonmaniam Sundaranar University library during the covid'19 should be improved.

↗ "Video-on-demand" service should be upgraded to attract more students.

↗ Open access sources of the Library should be well informed to the academic community.

↗ COVID-19 pandemic has brought about The M.S University library should adopt a fundamental change in the delivery of library services.

↗ Remote access services of the Library should be enhanced to provide better service to the users.

Conclusion

The sudden outbreak of the COVID-19 pandemic has brought about radical changes in the delivery of library services, as strict social distancing and lockdown measures were imposed in the early phases of the pandemic. Applications of new technologies in libraries have resulted in a meaningful and substantive change in libraries, their collection, services and methods of delivery of services. The concept and practice of providing remote access to e-resources by libraries are not new. Still, the user-friendly way adopted by many libraries and the number of resources made available by them during the pandemic is exemplary. Considerable planning by the library professionals will be required even after opening educational campuses. The Library's collection will change, becoming more interactive and remote access. The implications of these revolutionary technologies are enormous. Libraries have acted smart even this pandemic and evolved as a continuous learning storehouse. It can be said that libraries are emerging as a new venture of knowledge hubs capable of playing a vital role in supporting our nation to settle into a unique normal situation. This situation has opened a way for many new technologies in libraries and their users.

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