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# Diverging Library and Information Services, Converging Technologies, Surging Professional Roles and Emerging Scenario for LIS Manpower Development

**Inder Vir Malhan**

Department of Library & Information Science, Central University of Himachal Pradesh, Dharamshala, India

**Email address:**

imalhan\_47@rediffmail.com

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**Abstract:** Growing globalization, increasing competition and technological turbulences are demanding generation of new knowledge, more intensive search for ideas from all cultures and societies and adopt best practices. Institutions that generate new knowledge, accumulate the need and application specific knowledge and strategically use it are thriving and advancing in the present era. Libraries had always remained an important component of the knowledge infrastructure and are now required to undergo enormous transformation in view of the growing digital landscape, networked environment, and changes in ways users search, access and communicate information. Libraries have opportunities to expand their functionalities and offer services in newly diverging dimensions. While ICTs are converging for facilitating compact storage, quick retrieval and anytime and anywhere access to information from small handheld devices, a typical information user is facing information overload and time constrained environment and hence requires expert assistance in finding worthwhile information. The big data challenges, increasing unbundling of information, emerging new knowledge management (KM) tools, and content management software are offering new service opportunities for LIS professionals. How quickly professionals are able to identify service gaps, perceive and prepare for new roles, will determine the new service opportunities because when trained manpower is deployed at the right place and put to work, new possible services are automatically likely to take off. This paper presents the on-going changes in libraries, developments on information turf and their implications for information management. Discusses the surging roles and possible areas of service opportunities for LIS professionals. Portrays the opportunities for expansion and desired directions of change in the LIS education and training programs in India. In the wake of diverging functionalities of libraries and information centres, technological developments and surging professional roles, this study highlights the need for rejigging LIS education and training programs in India.

**Keywords:** LIS Services, ICTs Convergence, Professional Roles, Manpower Development

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## 1. Introduction

Information is *sin-qua-non* to every human endeavor. Nothing great was ever achieved without appropriate information inputs and access to strategic knowledge resources. Data and information are key ingredients for analyzing and assessing situations and wisely charting the appropriate path for action. These ingredients along with knowledge resources are the major motivators for initiating things, starting new endeavors and venturing into new domains of human activities. Individuals, institutions and

nations that created adequate knowledge infrastructure and made appropriate use of it, have advanced and developed. However, data information and knowledge resources are such intangible resources where no single individual, institution or nation is supposed to survive on self-dependence only. Nations, institutions and individuals require sharing such resources for leveraging advantage from each other. Growth of the internet, development of the web page and emergence of social media not only connected millions of people across the world for sharing of ideas and information but also democratized the process of access to information and

created a framework for every user to access information, share ideas and create content. This resulted in huge problems of information overload, info stress, and big data challenges. The information users are thus now working in a data deluge, seamless and incessant flow of information kind of environment but they often have time constraints. This kind of situation is shifting ways how information is collected, presented and used within the given time constraints. Data analysis and visualizing tools are gaining ground for smart work and more convenience for information user communities.

Access to information is no more a problem area and facilitating access to desired information is not the actual demanded service now. However, value added information services that provide access to filtered, focused, concise and actionable information, which have utility in particular situation and specific contexts and which can be comprehended and assimilated in the shortest possible time remains in high demand. This paradigm shift in information demands will have profound influence on libraries. There are other players competing with libraries providing summarized essential information recorded in best books and thus saving users time. For instance, Blinklist provides access to more than 2000 top non-fiction bestselling books in 18 leading categories which are transformed into powerful packs which one can read or listen on the go [1]. Information users are increasingly looking for more convenience, ease and saving of time in information products and services and hence technology enabled fee based services are emerging which may help them to assimilate worthwhile content in least possible time. An app called Joosr, which aims to help users read a book in 20 minutes, has been launched in the UK [2]. Information users will naturally prefer filtered content that ensures best quality can be read in the shortest time. If libraries are to stay in business and receive more public recognition and appreciation, they will have to conform to such new service demands and information seeking patterns of users' communities. They will also have to expand and diversify their services to facilitate comprehensive information support that helps everyone get going in their learning pursuits and work practices.

## 2. Diverging Library and Information Services

A modern library deals with select in-house knowledge resources and an ocean of external sources of information and sky is the limit for rendering knowledge based services. If meticulously planned, everything can be embraced in the service domain ranging from career counseling, data curation, information analysis to knowledge consultancy, infographics and managing intranets. Libraries had been mostly doing the work of making accessible the knowledge bundled in organized document collections that can meet targeted users' information requirements. Now they have ample opportunities to pursue new functionalities of content

management, strategic knowledge accumulation, knowledge alignment and its application management. Dealing with security of information resources, challenge of building knowledge bases through resource sharing is no more a big issue, instead networking and co-working to manage information overload and info stress is need of the hour. A lot of quality information is in fact available in the open sources that can be evaluated for relevance and quality by libraries and organized and made accessible to their user communities.

From selective dissemination of information, there is a shift to creation of knowledge architecture and knowledge alignment with on-going work to ensure seamless and better information support. From just in case access to information, there is a new service challenge to real time access to desired information. Reference and referral services are metamorphosing to knowledge consultancy, problem solving through information prescriptions and evidence based learning. Providing access to broader related content and asking users to make choices is no more a library service norm. Delivery of high quality content from all possible resources suitable to specific situations, contexts, projects and activities is need of the hour. Libraries therefore require to revamp their systems to ensure free flow of knowledge in processes and work practices. A new area namely imbedded librarianship is emerging which advocates the practices of knowledge alignment with more intimate observance to users on-going work practices and working out how the work practices can be enhanced through integration of knowledge resources and knowledge based services. Library must develop a knowledge architecture that encourage continuous learning, improve research performance and support the pursuits of innovation. Closer interface between library and information technology services, human resource management system and research management system of the institution will be beneficial for all. At the higher level of management, better interface between institutional leadership and library leadership is desired to develop a collective understanding of how knowledge based services and information delivery can make a difference in institutions performance.

Libraries are dealing with distributed information environment and now have the advantage of access to global information resources. Their functionalities and services are diverging as there is enormous scope to diversify and create more value while rendering library and information services e.g. information packaging and repackaging, fact filtering, idea identification, content collection and aggregation, information refining, data curation, and creating knowledge mashups through worthwhile information integration. Library is also transforming to an information refinery for qualify filtering of information, and creating information by products and services that find applications besides providing information to keep the system of research innovation and learning smoothly running. The fluid electronic information environment on one hand and existing service gaps on the other offer libraries to embrace a large numbers of new services such as maintain data centre of the institution,

develop and maintain institutional repositories, develop and maintain facilities for webinars and videoconferencing centre of the institution, stream need based real time content in smart classrooms, maintain information analysis centre, publication division and content development facility, studio facility for video recording, information literacy facility, etc. With such diverse services at one place, the library has the potential to transform to a theoretical research centre for research in various domains. When one have all the needed quality filtered facts, data and information at one place what is required is human thinking for inference and knowledge creation. Spectra of new possible services may push libraries to dynamic new models of service. Besides maintaining their core values and purpose, they can progressively do more in providing data, information and knowledge resource support to their client, customizing personal assistance and tailoring services according to what is most desired in a given time frame and situation. As their services are diverging and ameliorating, libraries are charting their journey to a new future. The major drivers of change in libraries that will continue to influence their course and direction of change are:

1. Growing media formats for communication of ideas and information
2. Increasing level of unbundling of information.
3. Big data challenges, growing demand for quality filtering of relevant information, navigating and picking up useful ideas from the ocean of information.
4. Libraries may face more demands for accumulating and organising content for evidence based learning, and problem solving, mission oriented and commercial value creation research.
5. Greater need to accumulate content that is interesting, engaging and amusing for learning
6. Changing patterns of information access and learning styles and greater need for liaison and connectivity with the information user communities.
7. Emergence of a variety of knowledge management and data analytic tools and content aggregation services.
8. Growing need for uninterrupted and speedy access to relevant worthwhile information disregarding time of requirement and location of user.
9. Emergence of new information service providers and completion with such service providers.
10. Libraries will be facing concerns for justification of funding for libraries and hence have greater need for advocacy as well as require enhancing their role in social informatics and in building social capital.
11. There will be pressures for innovations in library and information services for more value creation and value addition in information and knowledge based services to sustain in the competitive and turbulent information market.
12. For sustenance over time, libraries may require to embrace new service areas such as data analysis, information analysis, strategic knowledge

management and report generation.

13. Domain specific and individual focussed empowerment through customized media and information literacy interventions.
14. Integration and convergence of information and communication technology power in small handheld devices

### 3. Convergence of Technologies

Hyper competition in information and communication technologies domain is flooding the market with new devices and applications, offering more value and technological convergence in single devices for user communities. The SD card association has announced its next generation SD format SDXC (SD-extended capacity). The new format uses the same SD card connectors but increases the maximum storage capacity from 32GB to 2TB [3]. Tracking technologies and tools help to know the current status of delivery of documents to distant recipients. The future belongs to unmanned flying machines and just like Amazon drones can deliver the goods to costumers, libraries could deliver the books to patrons. Library drone is not even the close future. It is already happening. Australian start-up Flirtey has teamed up with a book rental service Zookal to create the first in the world-textbook delivery systems. The system is using hexacopters, drones with six rotors, to deliver ordered books. Now the smart thing is that drone can find you by the location of your smart phone, so there is no need to give a fixed address [4]. Libraries are therefore moving inside out serving their users as and where they are. E-resources of a library are accessible from any place through software tools like EZproxy and Discovery. LibrAR, I is an image based augmented reality application which allows users to search books with AR interaction. The location of books is pointed on the physical space by augmenting pointers. The app also allows finding out related books which can be again pointed to locate it. librARi locates different section of books and all new arrivals at different sections. The augmentation experience can be further extended to smart glass, which will give a natural interaction experience while reading [5]. Cloud computing is gaining ground for information storage and access.

Developments in artificial intelligence technologies and cell phones are leading to upheavals in the ways we share, create and access information. Artificial intelligence based automated systems that scan digital information resources of comprehensive databases help in collecting specific information and generate desired contents. Google has provided British news agency Press Association \$ 805,000 to build software that will gather, automate and write nearly 30,000 local stories a month [6]. Facebook, Twitter, WhatsApp and other similar sites are becoming a new norm for exchange of information and ideas. With the growth of social media, most of global population is connected with networks and because of social media and video calls, the video content is likely to grow. Integration of I P networks

and optical network models will provide a solution to accommodate heavy data transfer demands. A variety of collaboration tools are emerging for co-creative activities. Information communication technologies, besides bringing agility in operations and promptness in services, are providing means for outreaching and instantly getting connected to information users. Various technologies and applications are converging to a mobile platform and hence libraries must anticipate more mobile based accessibility and sharing of information. By 2021, the compound annual growth rate (CAGR) for total mobile data traffic is expected to increase to 45 percent [7].

#### 4. Surging Professional Roles

There was no time in the history of librarianship as to-day that indicates so many opportunities to embrace new service areas and expand on the service base of libraries, provided the library professionals timely identify the on-going service gaps, quickly acquire new competencies and swiftly step into new roles. As new possible roles are emerging, the roles and responsibilities of library professionals are surging to new levels of information handling and service performance. Increasing volume of digital information resources, networked environment, polymedia information ranging from e-books to blogs and velfies and new generation of software and knowledge management tools to manage such resources demand different skills and competences. As the organizations are restructuring, the profile of libraries is changing. We are at cross roads where on one hand, we have opportunities to embrace a bigger role provided we acquire desired competencies and skills and on other hand we have threat of elimination if we let the work go on as it is going on and continue idling over time with our traditional roles making no efforts for renewal and up gradation. The bigger role side is an endless road of opportunities but demands proactive work from library and information professionals for parent institution, to improve its performance and help achieve its goals through knowledge management initiatives. Library and information professionals can make inroads in parent institutions work by providing potent inputs for strategic plans, measure institutions' ranking through bibliometric analysis and suggest measures to improve its effectiveness and standing. They can manage Intranets, Extranets and other paperless information systems of the institution. They may manage the data centre of the institution and provide data analysis and contents analysis services. Creating needs based portals of information required by management and researchers, identifying, locating and facilitating networking of researchers doing similar work, creating virtual libraries, developing institutional repositories, providing anti-plagiarism software tools, helping institution in copyright and IPR issues, liaising with grass root innovators, indigenous knowledge practitioners and interfacing with industry can be other professional roles.

The role of building a knowledge base for the institution

has also been extended which includes negotiations with publishers and E- content providers in the best interest of institution taking into consideration what the institution needs and not what the content providers want to supply. Library and information professionals have potential to get into knowledge management roles identifying ideas and worthwhile knowledge from streams of information and managing such accumulated knowledge that may be useful for the institution. Developing innovative services, information products that enhance learning and encourage knowledge intensive work practices are other areas of greater roles playing. If library professionals are prepared to handle data analytic work, acquire information modeling and knowledge mapping skills, they can play a crucial role in providing knowledge based solutions to complex problems. Outreaching users making effective use of social media and creating specialized wiki spaces for users to encourage them share ideas and information, apprising them online on on-going work in their area of interest, preparing strategic knowledge plans in alignment with strategic plans of the institution, evaluating outcomes of knowledge infrastructure developed and services rendered, are the technology enhanced and management specific roles.

Co-creating personal libraries of researchers through expert assistance of information accumulation using open source digital library software, empowering users with media and information literacy initiatives, developing and constantly improving the knowledge architecture of the institution are also expected service areas from modern information professional practitioners. The information professional thus have opportunities to play the role of knowledge consultant, researcher, information evaluator and organizer, co-coordinator, content aggregator, strategic knowledge manager, liaison and networking job handler, team worker, content producer and webmaster, learner, instructor and counsellor, data and content analysis service provider, IPR expert. He is supposed to be a visionary knowledge architect and undertake the job of identifying dots of activities and connect lines for flow of new knowledge and thus bridge the knowledge gaps. Having more knowledge and competencies of information handling work and acquiring new skills means opportunities for handling and managing more work, which culminates to preparing for a more demanding information professional who also automatically gets empowered, gains more confidence and prestige. It is not possible to prepare an information professional having all expertise to perform such surging diversity of roles. There is thus an opportunity to diversify LIS education and impart education and training in specialized areas to prepare manpower for specialized roles.

#### 5. Emerging Scenario for LIS Manpower Development

Competent and talented manpower is the key for sustaining existing systems of information handling and

bringing change for the better. In view of the digital India campaign, government initiatives for innovation and skill development and on-going H. E policy debates LIS education and training programs in India require complete revamp and up gradation. The opportunities offered by unbundling of information, big data challenges, growing trend of availability of information in digital forms and emergence of social media, our extended roles in knowledge management and knowledge intensive work practices demand massive expansion of LIS programs incorporating more specialized knowledge, skill based and new work performance related courses in the curricula. Not only we require aligning LIS programs with skills and competencies on demand in the market but also innovating courses that have potential to create demand for competent library information professionals and prepare them to offer differentiated value in information services in competition with other such service providers. The emerging scenario for revamping the LIS programs in India demands following interventions, initiatives and directions of change.

### **5.1. Courses in Content Management**

LIS programs require concentrating on content management courses as demands for packaging, repackaging and customizing content to specific situations and contexts is emerging and is likely to grow in future. In view of growing demands for need based information within given time frames, learners are required to be educated in content management software and content aggregation tools.

### **5.2. Courses in Knowledge Management**

As library and information centres are extending the tentacles of their services from document management, to content management and further strategic knowledge management, it is an appropriate time that library schools should prepare manpower for knowledge management and impart skills in knowledge based problem solving. Designing knowledge architecture, growing concern for knowledge gaps and knowledge alignment and evolution of knowledge consultancy kind of services provided by subject expert professional librarians is propping up the need for such courses in LIS programs for preparing library and information professionals. Moreover, the growing need of transformation of organizations into learning organizations will further push the demand for professionals having competencies and skills in knowledge management.

### **5.3. Diversification in Specialized Areas**

Decade after decade library schools in India have been focusing educational programs catering to the needs of various types of library systems, concentrating on print and digital document management and rendering services based on such organized knowledge resources. However every sector of economy requires evaluating, accumulating, process and frequently uses information to smoothly carry out the work practices. There is thus a huge potential to prepare

manpower in specialized areas such as agricultural informatics, media informatics, legal informatics, financial informatics, rural informatics, small enterprises and exports informatics, social informatics and so on.

### **5.4. Big Data Handling**

There is a massive service opportunity to prepare our graduates in big data analytic tools and technologies and increase their chances of employability offering them better deals in employment as there is a huge global demand and supply gap. Cocubes technologies analyzed results of 43000 assessments conducted for top analytic companies in the country over the last 12 months and collated the report titled, 'Guidebook Hiring Entry Level Analytic Talent'. It shows that data analysts at the fresher level are drawing an annual average salary of Rs 7 lakhs as against Rs. 3.2 lakhs for software engineers [8]. There is huge potential for growth of jobs in the Big data domain. According to Nasscom Big data analytic sector in India is expected to witness eight-fold growth to reach \$ 16 billion by 2025 from the current level of \$ 2 billion... Currently employing over 90,000 people in various data analytic roles, the big data analytic segment would require huge manpower over next five years [9]. Some libraries have started planning to set up data service departments and hence they need data library professionals to manage and smoothly run such departments and some research funding agencies are also asking for data management plans with research funding applications, the demands for data support services are therefore likely to grow. There is thus a big opportunity in incorporating big data in library schools curricula. As they have a sound footing imparting education in information handling, and thus handling data service education will not be much problem for library schools.

### **5.5. Digital Library Theory and Practice**

Volume of digital information is constantly increasing and in future LIS professionals are likely to deal with still more content in digital formats. They must be imparted training in various digital library software packages for creation and maintenance of digital libraries. A whole set of educational programs that cater to the needs of digital environment including acquisition, organization; preservation and dissemination of information in digital formats are required as some component in the courses is not adequate enough.

### **5.6. Information and Communication Technologies (ICTs)**

Advances in ICTs are not only fuelling changes in libraries and information centres, but are also offering opportunities for improving efficiency, ameliorating ways of information handling, collaborating with distance colleagues, and outreaching user communities. The emergence of cloud computing environment, recurring advances in hardware and software, polymedia formats of information, needs for hypermedia organization, metadata harvesting, information mining, database creation, portals and subject gateways

development, web designing and hosting, etc demand extensive training of LIS learners in ICTs.

### **5.7. Management Science**

Management issues are becoming as crucial as technological and technical concerns in smooth functioning of libraries and information centres. Growing cost of information resources, competition with alternative information providers, necessities of staff training, change management, cost effectiveness, need for measuring outcomes of services, marketing of information products and services, amply demand teaching of management science related professional courses to LIS learners.

### **5.8. Infometrics**

Institutions are by and large measuring their research outputs, performance of their researchers and monitoring their ranking and standing. Researchers often are also concerned with the impact factor of journals in which they want to publish and their own individual professional standing e. g. H-index, etc. Since things that can be evaluated, analysed and measured can also be targeted for betterment and improvement, courses like infometrics, scientometrics can be incorporated in the LIS programs.

### **5.9. Information Modeling**

Frontiers of knowledge in several disciplines have reached a level where further extension may not only require interdisciplinary team work but also solving complex research puzzles through all available techniques and methods. In such a situation information support services such as knowledge mapping, information analysis, information modelling may be helpful. Hence we must take initiatives to prepare professionals for such roles.

### **5.10. Media and Information Literacy**

MIL is an important competency for success in the 21st century knowledge society and we must train our graduates in this so that they can further train information users customising MIL programs according to the specific needs of the institutions wherever they work.

### **5.11. Entrepreneurship, e-Publishing, Media Production**

Library schools should also pursue the untapped dimensions of imparting education involving skills and learning that may help graduates in self-employment. Setting up start-ups in e-publishing, media production, e-marketing of information products, knowledge consultancy are some of the areas where graduates can be adequately prepared

### **5.12. Copyright and IPR Issues**

We can't ignore areas like copyright, IPRs and ethical use of information in the contemporary LIS programs as they remain a recurring concern for the institution, information users, as well as the library.

### **5.13. Other Areas of Concern**

In addition, LIS graduates be prepared for advocacy and negotiation skills, communication and presentation skills, time management, info stress management, guidance, counseling, and team management skills. We are operating in a hyper competitive and highly globalised environment where ethical systems and human values that regulated the societies decade after decade are eroding because of human temptations and greed. In such a scenario, there is also a need for human making education to help learners revisit moral philosophies and value systems that helped in the sustenance of human societies. Our own DLIS has started such a course namely, 'Knowledge based Life Coaching and Human Development' for our graduates.

## **6. Conclusions**

The on-going debate in Indian higher education (H. E.) giving importance to flexible, student centric, high quality and need based education, the government concerns and initiatives for skill development, innovation, digital India, etc., demand some reorientation in H. E. and LIS education is no exception to it. As a new initiative, the University Grants Commission directed the universities to adopt structured choice based credit system for postgraduate studies (80 credits) including 40 credits for core compulsory courses, 12 credits for core open courses, 16 credits from elective specialization courses, 4 credits for elective open courses, 4 credits for skill development courses and 4 credits for human making courses. Library and information departments are implementing this choice based credit system of education.

Some professionals think that libraries will eliminate in due course of time and so do professional practices. So far as human race remains need for information and accumulation of worthwhile knowledge will continue to exist because every human being has a curiosity to know and a perception to present. With the ever changing landscape of information mainly because of developments in ICTS, professionals may face some instability but not insecurity. Rather with the growing competition, information needs and KM requirements will grow which instead present enormous scope for LIS profession to expand, diversify professional practices and create specialized roles for professionals, This however require intelligent scanning of information environment, continuous adaptation, learning and unlearning, value addition and up gradation of what we do in our practices.

The LIS education programs in India prepare manpower with a focus of information handling in libraries and information centres whereas KM demands are surfacing from almost every sector of economy. Current LIS education models focus on the functionality of information resource building and provide desired information. The new knowledge resource based models are looking for information professionals who can quickly provide quality filtered information incorporating potential ideas to recipients

to do their jobs qualitatively and competently. Besides conforming LIS programs to current service demands, diversification, skill oriented curricula design, delivery of education through more practical courses, team learning, and project based learning, and internship are desired. If LIS professionals are educated to the desired level and in consonance to contemporary information handling needs and KM requirements, they can make a difference in their work places and contribute their share for advancing the goals of their institutions.

There is enormous gap between what is presently continuing in Indian LIS schools and what more is possible. An analysis of course curricula of various library schools in the Northern Indian universities reveals that by and large a considerable revision and diversification of LIS courses is desired [10]. Library and information education planners must intelligently undertake information environment scanning, integrate the best of opportunities that ICTs offer for information acquisition, processing and communication, keep a constant watch on users' ways of accessing information and thoroughly understand the anticipated changes in professional practices in libraries and information centres. After analysing these components in unison, they should design the curricula, upgrade facilities and prepare strategies for delivery of LIS education in tune to times and times ahead. Efforts be made to prepare LIS graduates imparting skills, competencies and acquisition of knowledge predominantly by practice that may lead to not only opportunities to serve in better ways and with enhanced efforts but also ensure a better deal in their lives.

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