

Conference Proceedings

7th National Conference

on

Library & Information Science

*"Access to Knowledge (A2K) through
Information Management"*



Sri Lanka Library Association
25th June 2009
Colombo



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7th National Conference on Library and
Information Science
NACLIS 2009

*“Access to Knowledge (A2K) through Information
Management”*

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Organized by:

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Association.

Preface

NACLIS, is the National Conference in Library and Information Science organized by the Sri Lanka Library Association annually. The conference reflects the growing enthusiasm of LIS scientists to be involved with scholarly and professional communication and to network among themselves as well as with professionals outside the LIS profession. The 2009 conference is somewhat at variance to those previously held, and is aimed at provoking more discussion and dialogue among the professionals, while at the same time providing the opportunity for researchers to present their work. Towards this end, the programme consists of two sessions ; session one will be a dialogue on the theme selected for the conference 'Access to Knowledge (A2K) through Information Management'. The main objective of the dialogue is to bring forth the perceptions of different categories of information users in accessing knowledge and also highlight legal and other barriers that affect the access of knowledge. The session is named 'Dialogue on A2K', and it will consist of presentations by three key speakers and a panel of eminent discussants in different subject fields. The discussion is hoped to be supported and counter argued with facts, concepts and ideas by a wide audience.

The second session of the conference is scheduled to provide room for paper presentations by LIS professionals and related papers by non LIS professionals. Out of nineteen proposals received, ten papers and one poster were selected after the blind review process to be presented in the afternoon session. The papers cover a variety of topics and perspectives including trends in intellectual property law in LIS practices, webometric studies,

e-journals and consortia, research & education, ancient symbolism etc. Three Indian authors have also contributed to the conference.

An annual conference, though confined to one day, cannot be successful without a collective effort. The NACLIS 2009 committee members and SLLA staff who worked hard to get the conference off the ground and review panelists who dedicated their valuable time should be thanked profusely. The SLLA and NACLIS committees are also deeply appreciative of the invaluable contributions of the Keynote speaker, other key speakers, panel discussants and paper presenters who have put in their best efforts to make this event a success. We would like to take this opportunity to thank our sponsors; LibSys India Ltd., Bank of Ceylon, ADB-DEMP Project, Asia Foundation, Consortium Books, D.S Books India Ltd. Sarasavi Bookshop, Blackwells UK., and Expographics. We appreciate your support that helped us to launch this national event in a professional manner. I also thank for the OUSL library staff for the support extended in designing NACLIS banner and for numerous secretarial work.

Editors

June 2009

Presidents' message

I am very happy to issue this message as the president of the Sri Lanka Library Association (SLLA) for this volume of conference proceedings of the National Conference on Library & Information Science (NACLIS), organized annually by the association. NACLIS 2009 is the 7th conference the SLLA has been holding since 2003.

Knowledge is a blend of experience, values and information in context, and insights that forms a basis on which to build up new experiences. Knowledge originates in human mind and springs from every corner of the world. The very fact is the challenge faced by the information professionals when they are to use their expertise to grasp and organize the accessibility to knowledge by different means.

However, is the knowledge generated free to capture by the information users? Are there any barriers that are socio-culturally, politically, technologically or economically emanated or legally imposed in accessing information? The time has come for the LIS professionals to give a serious thought about this fact and the time has come for them to create a dialogue with other professionals who are the knowledge creators as well as information users. The movement, called 'A2K (Access to Knowledge) movement', therefore had already taken its steps internationally. I think the SLLA is highly suitable to initiate and launch this dialogue in Sri Lanka. Therefore NACLIS 2009 hopes to bring up A2K forum in a small way, dedicating the morning session of the conference for the 'A2K dialogue' with an eminent panel of discussants.

It is also a great pleasure for me to see the enthusiasm shown by new LIS scientists to communicate their research in this forum. Out of many good research papers received only the best were selected.

Though the association had published the papers of NACLIS in a CD format during previous years, the proceedings of NACLIS 2009 is the first of the printed kind. I am confident that the deliberations of this conference will definitely enhance the professional thinking in novel avenues. I specially thank the NACLIS committee, especially its convener Dr. Wathmanel Seneviratne, panel of reviewers, key speakers, dialogue panelists and paper presenters for their contributions.

Prof. Piyadasa Ranasinghe

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Proceedings

Keynote Address

Role of libraries in a knowledge society

Professor Emeritus in Education

(Mrs) Chandra Gunawardena

Emergence and significance of knowledge society

The new Millennium has been described as an age of knowledge, in which the resource for prosperity has become knowledge itself. Unlike natural resources utilized in the economic transformation that took place earlier, knowledge is inexhaustible; the more it is used, the more it multiplies and expands. Today, the emphasis is shifting from creating and transporting physical objects to knowledge itself. Knowledge accumulation is increasingly at the core of a country's competitive advantage, which is itself determined by the ability to innovate in a continuous manner (Holm-Nielsen).

The terms 'knowledge society' and 'knowledge economy' came into being during the last decade and are being increasingly used in

any discussion of development today. Today we live in a Knowledge Society where the knowledge production of our educational institutions is central to the reproduction of the wealth of our nations and it is important to develop institutions that can support the public access to knowledge and the 'knowledge circulation' of society.

"Knowledge economy" is identified as a major force driving change in our world. It is argued that the period of rapid and profound economic, social and political transformation that the world has entered today is driven by the emergence of a radically new system for creating wealth that depends upon educated people and their ideas. It is shown that the strength, prosperity and welfare of a nation in a global knowledge economy will demand a highly educated citizenry enabled by development of a strong system of education at all levels.

A knowledge society will not evolve or sustain itself, however, merely through the development of a highly educated segment of the population. While a half a century ago, the emphasis was on educating 'the best and brightest', the academically elite, the skills race of today values the skills and knowledge of the entire workforce as a key to economic prosperity, national security and social well-being. In face of explosion of knowledge in almost every field, the shelf life of education provided early in one's life is shrinking rapidly. Moreover, longer life expectancy and lengthening working careers create an on-going need to refresh one's knowledge and skills through formal and informal learning. This is where access to knowledge for all becomes a priority.

UNESCO's overall mandate is to promote the free flow of information by word and by image and thus to place information

and knowledge at the doorsteps of communities (UNESCO, 2008). Thus UNESCO strives to forge an enabling environment to facilitate and open up avenues for universal access to information and knowledge.

The National Knowledge Commission of India in 2006 was assigned with the task of preparing a blueprint for radical improvement of knowledge access, knowledge creation and application by and for the people of India. The Commission affirmed that a national drive to ensure access to knowledge and learning can transform India's potential for development, lift Indians to new levels of understanding and competence and make India one of the leading knowledge societies in the world. The Commission states that in making the recommendations, it was guided by 'how knowledge will impact the lives of ordinary hardworking people of India. We are conscious that knowledge is about farmers having access to having accurate information about water resources, land quality and fertilizers, students having access to schools and colleges of high quality and good libraries, scientists having access to well-equipped modern laboratories, industry having access to skilled workforce and people generally having right to information and good governance.

Role of libraries in a knowledge society.

Knowledge is foundational to all spheres of life and critical for the growth of society. It is produced when information is absorbed, processed and internalized by individuals. The library, as a major source for information serving a wide spectrum of information seekers, is central to the facilitation of knowledge generation. Libraries as knowledge institutions provide spaces for information-

sharing and learning for all ages, genders, ethnicities and socio-economic groups regardless of their information/knowledge needs. Libraries facilitate access to information and provide the means through which new knowledge is developed and made available to all.

UNESCO (2008) explains how universal access to information and knowledge can be ensured. It focuses on Open Access to information and knowledge as an innovative mode of scholarly communication within the digital environment aimed at achievement of universal access to information and knowledge. While Open Access helps digital inclusion of citizens in developing countries by bringing within easy reach full-text contents of scholarly works, documentary heritage collections and development-related literature, the Digital Library remains a knowledge repository of such citizens, indigenous people, communities and institutions. Open Access to knowledge is shown as a model adopted by many international and intergovernmental fora, such as the World Summit on the Information Society (WSIS), for disseminating full-text contents to online communities.

UNESCO in accordance with its objectives, recently launched the World Digital Library at its headquarters in Paris. Drawing on content from libraries and archives worldwide, it aims to reduce the rich-poor digital divide, expand 'non-Western' content on the web, promote better understanding between cultures and provide a global teaching resource. Bringing together priceless material, from ancient Chinese or Persian calligraphy to early Latin American photography, it is the world's third major digital library, after Google Book Search and the EU's new project, Europeana.

Working Group on Libraries of the National Knowledge Commission of India recommends that

1. To enable equitable and universal access to knowledge resources, it is important to create more digital resources which can be shared. The concept of an "information commons" i.e. "resources shared by a community of producers and consumers in an open access environment" needs to be promoted.
2. New resources should be openly accessible and historical documents, too, should be digitized and made available.
3. Peer-reviewed published research papers resulting from publicly funded research in India must be made available through open access channels, subject to copyright regulations and the use of open standards and free and open source software.
4. All pre-independence periodicals and newspapers in all Indian languages and in English must be digitized for access and preservation.
5. To help preserve digital resources, optimize their use and avoid duplication of effort:
 - State-level archives for preservation of digitized materials must be set up.
 - Every State should establish a registry and archives of knowledge-based digital resources, and make it accessible.

Under Libraries, the Commission recommends to

1. Set up a National Commission on Libraries
2. Prepare a National Census of all libraries
3. Revamp Library and Information Sciences education, training and research,

4. Re-assess staffing of libraries,
5. Set up a Central Library Fund,
6. Modernize library management
7. Encourage greater community participation in library management,
8. Promote Information Communications Technology applications in all libraries
9. Facilitate donation and maintenance of private collections and
10. Encourage private-public partnerships in LIS development

At the same time, concerns are expressed about the trends occurring in the field. Some of these concerns have been articulated by Hjørland (2008). These are

1. Challenge posed by the "library shortcut": that producers and users of knowledge communicate directly without the need of intermediaries,
2. That free user based encyclopedias such as Wikipedia will remove the need for (carefully) edited encyclopedias,
3. The disappearance of the Library, Documentation and Information professions
4. The potential arrival of a truly usable e-book technology, which could begin to make rapid inroads into the use of printed books, with all the implications that would have for libraries;
5. The supplanting of academic libraries by information provision through e-learning environments and from the web; and
6. The new role of the public library as a community centre, with books and information provision an increasingly marginalized aspect.

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Dillon (2007) in fact, points out, that historically almost one-third of the LIS programmes founded in United States have closed down and with McGill University becoming the latest University to drop the word 'library' from its name, now one-third of the currently accredited graduate programmes in librarianship in North America are offered in schools named "information" or "information studies".

Implications of present trends for library and information science in Sri Lanka

What are the implications of this scenario for Library and Information Science and for professionals in the field in Sri Lanka? This definite shift to web-based learning from conventional learning would obviously impact on Library and Information Sciences, as a discipline and therefore the careers of the professionals working in this field.

On the one hand, as India has already contemplated, adequate provision of infrastructure facilities and familiarization of all citizenry with the use of digitalized information becomes imperative. On the other hand, it necessitates education and training for professional engaged in the field, not only in traditional librarianship but in the broadened discipline of Library and Information Sciences.

Rath (2007) suggests that if the Library and Information Science professionals are to contribute to the development of a sustainable knowledge society, they would need to have the skills

- To identify and investigate information needs and information seeking behaviour of the user community,
- Understand the importance of information architecture to determine the structure, design and flows of information;
- Forecast, plan, facilitate and evaluate appropriate resource management to library and information services.
- Enable information access and use through systematic and user-centred description, categorisation, storage, preservation and retrieval
- Provide and promote free and equitable access to information and client services;

- Facilitate the acquisition, licensing or creation of information in a range of media and formats.
- Design and deliver customised information services and products;
- Assess the value and effectiveness of library and information facilities, products and services;
- Market library and information services;
- Identify and evaluate information services, sources and products to determine their relevance to the information needs of users;
- Use research skills to provide appropriate information to clients.
- Understand the need to develop information skills of the user community; and
- Facilitate the development of information literacy and the ability to critically evaluate information.

It is clear that such a massive exercise cannot be handled individual libraries and librarians or even a professional body such as the Sri Lanka Library Association. State authorities like the National Library and Documentation Services Board and Department of Library and Information Science, University of Kelaniya and National Institute of Library and Information Science, University of Colombo and other provincial and district authorities need to collaborate and formulate an Action Plan so that all citizens of all parts of the country can benefit from an endeavour like this. While we are aware that SLLA has taken the initiative to develop an online Diploma programme, there is a need to extend access to this programme and enable would-be participants to gain the opportunity to update themselves on the developments in the field.

In conclusion, I would like to end on a personal note. The major part of my student and working life was spent on reading, be they academic work, books to enhance personal or professional or generic competencies, and of course, fiction. I would say, that for me, these were the most satisfying and enjoyable time of my life. Even though at present, accessing knowledge on the web has been quicker, an opportunity to access anything, anywhere at any time and also more convenient, the real satisfaction you derive from going through a classical piece of work or a creative novel, I fear, can never be gained from such web searches. Therefore, I would urge the professionals here, of NAC LIS, to try to preserve that segment in your profession without giving way totally to Information Science, even though its real opportunities are assessed and targeted.

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Dialogue on
"Access to Knowledge
(A2K)"

Chaired by Mr. Upali Amarasiri

Panel of Discussants:

Dr. J.L. Ratnasekera

Eng. D. Witharana

Mr. Harrison Perera

Prof. Chandra Gunawardene

Dr. Nirmala Pieris

Dr. Tissa Hemaratne

Mr. W. Wijewardene

What is Access to Knowledge?

Dr. J.L. Ratnasekera

MEF Specialist, QEF, IRQUE, Ministry of Higher Education

1. Introduction

If the 20th century's primary objects of trade were oil, steel and unskilled labour, the 21st century deals with Technology, Information and Knowledge. This is why, when describing the present global reality, the scholars and policymakers use the terms such as *Information Economy* or *Knowledge Economy*. So, the *Access to Knowledge (A2K)* becomes an important aspect in our lives in the Information/Knowledge Economy.

In this regard, the term *Knowledge* broadly refers to information, data, tools, inventions, literature, scholarship, art, media and other expressions of human inquiry and understanding. Further, the term *Access* also broadly refers not only to the right to access these products as consumers, but also the right to participate as producers in their creation, extension and distribution/dissemination.

However, A2K can sometimes be a confusing term as it refers to four different things. According to Yochai Benkler [1], in this case, the term *Knowledge* embraces the following aspects:

1. Human Knowledge – Education, Know-how, Creation of Human Capital through learning new skills
2. Information – (e.g. News, Medical Information, Data, Weather Reports etc.)
3. Knowledge Embedded Goods (KEGs) – Goods where inputs to production involve significant amounts of scientific & technical knowledge, often protected by IPRs. (e.g. Drugs, Electronic Hardware, Computer Hardware etc.). However, in contemporary economic life, information and intellectual property provide an increasingly important share of almost all valuable goods.
4. Tools for the production of KEGs – (e.g. Scientific & Research Skills, Materials & Compounds for Experimentation, Computer Programs & Computer Hardware etc.)

2. A2K Movement

A2K is a set of principles that emerge from different social movements that are responding to the changes in economy and society influenced by new information technologies. Furthermore, *A2K Movement* is a reaction against “intellectual enclosure” seeking to reclaim things that were once treated as part of the common heritage of humanity, before they were converted into private property. A2K Movement is a demand for democratic participation, for global inclusion and for economic justice.

The 1948 Universal Declaration of Human Rights states: “Everyone has the right freely to participate in the cultural life of the community,

to enjoy the arts and to share in scientific advancement and its benefits". This is precisely the claim of the A2K Movement.

3. Three main features of A2K

According to Jack Balkin [2], there are three main features of A2K.

(i). A2K is a Demand of Justice

As the global economy develops, control over knowledge and information increasingly determines global wealth and power. As not all countries participate in the global economy equally, not all of their citizens enjoy its benefits equally.

Hence, A2K is a question of distributional justice, both within a society (i.e. rich and poor, men and women etc.), and across different societies (i.e. developed and developing countries or countries in the North and the South).

In other words, A2K means that the right policies for information and knowledge production can increase both the total production of information and knowledge goods, and can distribute them in a more equitable fashion. The goal is first, promoting economic efficiency and development, and second, widespread distribution of those knowledge and informational goods necessary to human flourishing in the present global networked Information Economy.

(ii). A2K is an Issue of Economic Development + an Issue of Individual Participation

It has to be emphasized that the A2K is not only about economics and development. In other words, A2K is about more than

increasing GDP or promoting rapid development. For example, we might promote human development through producing lots of information goods for people and distributing them widely. On the other hand, we might promote human development by promoting decentralized access to information tools and by encouraging participation in the production of information goods by large numbers of people.

A2K is about the second strategy (i.e. participation), as much as the first. Or in economic terms, it is about whether information production will be primarily centralized and proprietary, or whether large parts of it should be decentralized and participatory.

(iii). A2K is about Intellectual Property, but it is also about Far More Than That

International IP and trade regime has increasingly adopted policies that prevent the efficient and equitable flow of knowledge, information, and knowledge goods. However, if our goal is the promotion of human flourishing, economic development, and human freedom, Access to Knowledge must look beyond international trade and IP policy.

We should not forget that the governments promote access to knowledge in many different ways besides IP laws, i.e. through regulation and deregulation, through government procurement policies that encourage private actors to produce knowledge and information goods, and through the government's own provisioning of information, knowledge and education.

4. A2K and Libraries

Libraries and education are synonymous. A library has little meaning if it cannot impart knowledge. Good education cannot exist without

access to quality information resources to support teaching, learning and research.

Libraries of all types therefore are an essential building block in the information society and the starting point from which citizens can have access to information on an equal basis and in a trusted and neutral setting. This is why libraries are a key component in the rapidly growing A2K Movement.

Libraries in developing countries are working hard to ensure that learning content is made available to the widest possible base as part of their focus in achieving the development goals, and in contributing to the social and economic development of their countries.

A2K means many things to many people. If you ask different librarians from different countries about what do they understand by A2K, you would get a wide variety of responses. Those responses would, no doubt, reflect the diversity of language and culture. However there would be one common goal. That is of making the A2K a reality for Library Users.

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Conflicting Agendas of Knowledge: Protection Rights of the Author and Access Rights of the Public

Dileepa Witharana

Senior Lecturer, Project Leader, A2K Project OUSL

Humans are set apart from other living beings due to their supposed higher intellect that allows them to be creative intellectually in ways far superior to other living beings. Each age of human history has been marked through a leap of human knowledge whether it be through a discovery that propelled civilisation in a particular direction, a spiritual awakening, an artistic creation or political revolution. The development of human knowledge, creativity has always being considered something precious and important.

Of course, the question what is knowledge and which forms or types of knowledge is superior and the domination of a particular type of knowledge over others has also been evident in human history. Categorisation of some forms of knowledge as

'formal'some other forms as 'informal'or 'traditional'reflects this reality. Legitimacy of knowledge systems does not necessarily depend on the level of the ability of a knowledge system to explain things or the value of usage. This particular issue perhaps is of concern in our own historical moment more so than during any other time. Perhaps due to the technological advances that has taken place especially with regard to communication, knowledge today reaches most parts of the world faster that ever before. Thus the power of accepted knowledge forms to dominate and influence our lives is that much more significant.

It is perhaps within this context that the question of who has rights over knowledge has become such an important question. Because those who have rights over knowledge also have the ability and the power to decide what is knowledge and therefore to dictate what is good, important and right in this world as well as what should be discarded and ignored. Furthermore, to put it crudely, today knowledge also means money-and lots of it. Knowledge is not merely about an intellectual exercise, philosophical arguments or spiritual discovery; knowledge is about products that are necessary for human life such as medicine, technology, books, artistic creations which can be bought and sold in the market. Thus, ensuring who has rights over buying and selling could be financially extremely significant.

The Intellectual Property Rights Regime came into being as a means of regulating the ownership and access to knowledge. The fact that it came into being as an international regime of strong monopoly rights during an era where a particular type of economic ideology was dominant is also significant. Within this economic ideology, it is believed that all members of society share the same

values of individualism and the pursuit of a greater share of material goals. Competition therefore is a natural state for human beings engaged in pursuing their self interested goals and satisfaction. This theory also states that human agents engage in rational economic behaviour and private property is a crucial component of this rational behaviour: unless individuals are guaranteed their rights to the profits and results of their efforts they would not be motivated to work hard and be innovative.

However, it can be argued that this world view which places individualism and self interest as the primary motivations behind human agency is but only one explanation of human agency. Collective goals or non material goals such as maintenance of relationships or working for common good can be equally powerful motivations for human agency. Furthermore, when the pursuit of self interested goals consistently leaves less powerful groups of people or individuals worse off or not benefiting equally from such goals, then indeed the whole rationality or even ethics of such values need to be questioned. But one of the characteristics of the neo classical economic ideology is its ability to separate values (or values that contradicts its principles) from its analysis of the outcomes of its theories and policies. Thus, the patently unequal knowledge regime that an IP regime helps perpetuate is legitimised as an outcome of market logic.

Within this market logic knowledge is not valued for its intrinsic value but for what its worth in the market. The market value of knowledge is generated in two steps: space is created to allow knowledge a private property that is owned by someone or something and free access to knowledge is denied in order to create a scarcity which would require people to pay a high price

in order to obtain and use knowledge. A third step in legitimising a market value for a knowledge product, perhaps, is to erase the fact from our collective memory that knowledge was a common good throughout the human history and knowledge as a common good had led to civilisations that were highly advanced in science, in art and in philosophy. Thus, we are not allowed to share our software with each other or to buy cheap copies; we cannot just search the internet and download articles of interest, music or movies that we enjoy; if we see a book at a friend's house that we desperately want to own we either have to steal it or buy it for ourselves at a heavy price (we are not allowed to photocopy it), our ability as individuals or as a community decide to save seeds and exchange seeds among ourselves instead of buying it from the mudalali is increasingly under threat and our ability to take apart a machine, see how it works and producing a similar model at a low cost even for our personal use is not allowed, I am not allowed to translate an important textbook into Braille for the use of my visually handicapped students and as a lecturer of the Open University I am not allowed to photocopy a journal article and distribute among my students, nor am I allowed to translate into local languages a book that I consider essential for the development of our country and so the list goes on....

If these restrictions existed in a situation where all other things were equal, where we all had comfortable incomes that allowed us to spend on purchasing knowledge products without having to think twice, if all our libraries had large enough budgets to subscribe to the latest databases, if we were producing knowledge that others were paying large sums of money to purchase which could then be used to create more knowledge, perhaps we could understand the existence of such a system. However, in a situation, where if

the state does not provide uniforms and text books our school drop out rate would increase drastically, where the cost of purchasing even the most basic original software would be more than the monthly income of most of us in this room, where schools and universities are struggling to pay their electricity bills let alone provide internet facilities for their students, where our libraries our struggling to buy a few new books every year, this cannot be considered a fair system. Especially, it is the poorest and the most marginalised of the world population who are consistently being deprived of these. This is not just a question of envy of those who have and a bitterness regarding our own deprivation; this deprivation has a direct impact on our ability to have a say or influence the directions the world is taking, policies and theories that influence our lives and to make the discoveries or to produce what is necessary for us to live healthy and comfortable lives.

This system becomes further incomprehensible when you consider the fact that the system does not actually protect the creator of knowledge, but rather the large companies which pay the salaries of these innovative and creative individuals. For example, Microsoft owns all the software programmes and reaps the profits not the individual programme writer or creator.

It is within this context that we need to even talk about Access to Knowledge; or to talk of it in capitals. Previously, our access to knowledge was something we took for granted, within the Intellectual Property Rights regime it is something we have to fight for.

As I mentioned previously, our access to knowledge has serious implications as to whether we are merely consumers of knowledge

or producers of knowledge. All knowledge that is created and the innovations that come out of our knowledge build on earlier knowledge, creations and inventions. No one produces knowledge or creates something in isolation. We need to learn and be inspired by the work of others and to teach and inspire others in our turn. When our access to the work of others is restricted, denied or made difficult, our ability to produce or create becomes restricted in turn. This means that we have to rely on the creations of others for our own development. Let us consider what this means.

The human race is highly diverse—we have different needs, interests and priorities based on our diverse cultures and environments. Theoretically, this would mean that our world should produce highly diverse and varied systems of knowledge and thinking. However, what we see today are a few dominant ways of thinking about the world and about doing things in the world. It is the same group of people who tell us how the world is and how the world should be. Even if we look at how things are within our own country, a few people dictate how things should be. This means that only what is deemed as knowledge (and information) by the few or is captured within the dominant paradigm has any legitimacy; other systems of thinking or knowing are denied that legitimacy and recognition. And when we are then deprived of accessing the knowledge of even those dominant systems, our ability to critique and challenge them also become restricted. Thus, the majority of us become merely consumers or users of knowledge—not producers. This is perhaps a denial of what essentially makes us human: our potential to be creative and innovative.

So what do we do? What is our responsibility in all of this? I would like to propose that we have two tasks: one is by far the

more challenging since it would mean that each one of us has to re-examine some of the most dominant concepts of the modern world. The other, is perhaps a more pragmatic option of working within the current model.

1. The more radical proposal is that instead of a regime that protects the 'author' and the 'creator' our basis for a regime would be to provide access to knowledge. Within this regime, mechanisms would need to be put in place to protect the author and creator.
2. The second proposal is to seriously consider the flexibilities that are available within the current Intellectual Property regime most of which are unfortunately not incorporated currently in the Sri Lankan intellectual property law and to ensure that local regulations use them to the maximum.

I don't believe we have to choose between these two proposals; I believe that we have to engage in both. It may make our lives more challenging and difficult, but this is perhaps the task that is before us.

Access to Knowledge (A2K) through Information Management: Is Phoenix rising Or.....

Harrison Perera MBE

Librarian, University of Peradeniya

The theme of this Dialogue Session in fact is rather ambiguous but I would not take the stand of Wittgenstein the positivist philosopher who remarked "whereof one cannot speak, thereof one must be silent" as it would end this dialogue! I leave it to the learned panel of experts if they wish to wrestle with definitions of such words as "access, knowledge and information." My modest intention is to express few thoughts taken into consideration professional experience I have gained during the last 30 years. My personal views may be rather controversial as I am a Librarian and some of the thoughts I express would be contrary to the romantic view of Librarianship.

I am a romantic person though romantic librarianship needs to set side for the sake of our professional future.

I entered the Library professional when technology started getting involved in our life and work. I was fortunate to witness the slow but steady growth of the technology and its impact on our profession. Now the dazzling technologies have almost overpowered our profession, but I could still vividly remember how I tried to master the punch-card system for a simple computer tutorial. So much for reminiscence !

Historically libraries were popular in the storage and preservation/conservation of material through which knowledge could be obtained. Librarians were highly capable of this role until the birth of ICT. With the dazzling technologies the dependence on libraries to retrieve relevant knowledge has diminished. And with that diminishing of importance, the knowledge and information seeking behaviour of the users has moved away from physical libraries to cyberspace.

Even the term "knowledge" has been to some extent being replaced by "information". Perhaps one could argue the process starts with information and culminates in knowledge. "Information or knowledge management" in primitive stages was the forte of Librarians. However with the growth of massive information in practically all fields of knowledge has made the task of "management" impossible for Librarians. Ergo, they have turned to the ICT giant for assistance. Have the Librarians harassed the mighty ICT dazzling technology for accessing knowledge or even to manage the wealth of information ? I very much doubt whether we have many a success story.

It was the fourth Librarian at UP, late Mr. Ian Goonetilleke who made the famous statement that it is not the new technology but

the role of the Librarians which matters most in access to knowledge. But have the Librarians conquered the battle for access to knowledge in today's information management ?

Librarians continue to over-value cataloguing and classification. D.N. Phadke [1999] states that Hypercard call number Directory was introduced as classification system was not very successful in finding materials in the Library. They have not understood that the prime factor in Librarianship is that libraries are in the SERVICE SECTOR. Hardly any of them discuss the critical importance of QUALITY and CUSTOMER CARE which are biblical imperatives in the service sector. Librarians have set ways and means in managing libraries. With ICT, they seem to be 'touch and go' but major victories have not been achieved though lot of chit chat are in the air. Only lip service being paid to dazzling technologies, to migration of resources, on-line, digitization, virtual learning environments etc.

Demands of information seeking users have dramatically changed but unfortunately libraries have either not realized this change or ready to make parallel changes in information management. Vision and Mission of respective Organizations, where libraries are information delivery units, should be carefully understood with the information needs of the users. Librarians should be subject experts, ICT skilled and assertive to command respect from Top Management to make an IMPACT through the libraries which are "shop windows" for every organization.

Perhaps librarians do know the five laws of Librarianship, but have they made an impact or access to knowledge through information management successfully.

Libraries are more than resources (Siva Vaidhyanathan, 2005). John E. Buschmon et al (2007) says the Library is a PLACE as well as a SPACE for it bring in the users for Social harmony (Place) and provide opportunities for research discourse (Space).

It is now argued that Librarians should practice "Philosophical Thinking" (PT) which leads them to curious Questioning, investigating, analysis and synthesis.

For the success in the provision of access to knowledge (A2K)the following are vital:

- Generational Change (various user Communities)
- Societal Change (Post-Modernism)
- Technological Advances (Critical importance of Information Technology)

Concluding I Quote from "The World is Flat" the winner of the Business Book of the Year Award of Thomas L. Friedman,

"If its not happening, its because you are not doing it "

In the age of financial crisis, poverty, poor health and less educational opportunities perhaps libraries should concentrate more on how to literate their users !

Paper Presentations

Session - 01

Intellectual Property Law and Knowledge Management

Right to intellectual property vs. right to access to knowledge: a contemporary analysis with special reference to Sri Lanka

Tissa Hemaratne

Abstract

It is axiomatic that copyright law protects the 'copyright works'. However, the body of copyright works like other intellectual property involves the whole range of aspirations of human life, historical, cultural, legal, and religious backgrounds shape the institution of 'copyright works' in any society. Hence, there is a paramount inherent obligation for the owners of the intellectual property including creators of copyright works to facilitate the society to enjoyment of the benefit of such works, which sprung as a result of absorption of the existing knowledge of the society.

This research paper provides an insight into the current position of copyright legal regime in Sri Lanka. It outlines the perspectives of exceptions to the copyright doctrine with special reference to libraries

that make knowledge accessible. In addition, it attempts to examine and propose whether and how Sri Lanka could have succeeded in managing the disconnect.

Key words

Access, copyright, exemption, knowledge, library, Sri Lanka

Introduction

Access to information is essential for the education and research as well as for the economy, institutional and personal development. The information sector has been seriously threatened by various factors such as financial, legal and political since it hinders this access to information. Likewise, status quo has been worsened with the rapid growth of information and communication technology, which increases transforming the production, dissemination, storage of information and economic exploitation of information.

Moreover, access to knowledge is traversed with the expansion of legal protection for technological measures¹ that restricts access to information. Sri Lanka is not an exception to this phenomenon. Hence, it is questionable as to whether the role and mission of librarians, information managers is being properly achieved. In other words, whether the librarians and information managers are being able to collect, organise, preserve and make available the world's cultural and scientific heritage for current and future generations in Sri Lanka.

¹. Commonly these measures are known as Technological Protection Measures (TPMs) which includes Digital Right Management Systems (DRMs).

This research paper gives an overview of the current copyright regime in Sri Lanka, from the perspective of both rights-owners and librarians. It considers the issues raised by the copyright regime, which undermine not only the role and the mission of the librarians, information managers, but also impedes the development of the country in long term.

Accordingly, this research paper is divided into three Parts. Part one deals with a brief survey of copyright law, which traces the recognition and interrelationship of copyrights and access to knowledge. Part two briefly overview the copyright law in Sri Lanka. Part three examines the conflict, which can be arisen when Sri Lankan incumbent copyright law is properly enforced, between copyright owners and the librarians / information managers. Part four is the conclusion. A theoretical framework is proposed to guide policy and decision makers in determining how copyright laws in Sri Lanka can or should be interpreted to protect the balance between the right to copyright and right to access to knowledge.

PART ONE

What is copyright

Copyright law, which is a branch of intellectual property law,² protects a wide range of "works" against unauthorised exploitation

² Intellectual property is a legal device that gives exclusive rights to creations of the mind. It allows people to own their creativity and innovation in same way as they own physical property. Apart from copyright intellectual property consist of many things such as Trade Marks (service marks, trade Names), Patents, Industrial designs, Trade secrets (confidential information), Integrated Circuit Topographies, Plant Breeder's Rights, Geographical Indications.

in various forms.³ However, it must be noted before proceeding any further that this branch of law does not operate in isolation and has nexus with rights that emanate from other branches of law. Hence, copyright law should be considered within that context.

The nexus between copyright and access to knowledge

It is axiomatic that there is an inseparable nexus exist between copyright and access to knowledge. Copyright is incentives for creativity and innovation, for return on intellectual capital, for sharing of intellectual capital so that it can be built upon. The rationale of copyright is to encourage creativity, innovation by granting legal protection for creators to commercially exploit their works and to encourage access to copyrighted works to ensure further innovation, further creativity, research, and learning.

It is important to encourage innovation and creativity in the society by providing legal protection creator of copyright. However, it is equally important the wide dissemination, diffusion, and sharing of knowledge to encourage innovation and creativity.

Hence, copyright legislation needs to maintain a balance between private rights and the public interest for access to education and information. A balanced copyright regime is one that takes into consideration both the need to recognize and protect copyright in order to promote innovation, as well as the need for limits on copyright to promote other public interests. This balance is apparent in the intentional instruments with regard to human rights and intellectual property rights.

³ Copyright law does not protect ideas or information as such. It only protects the 'expression of ideas or information'.

International instruments and the balance

As far as the balance is concerned four main instruments are important to be considered.

1. The Universal Declaration Human Rights (1948).⁴
2. The International Covenant on Economic, Social, and Cultural Rights (1966).⁵
3. The Berne Convention for the Protection of Literary and Artistic Works (1886).⁶
4. Declaration on the use of Scientific and Technological Progress in the Interests of Peace and for the Benefit of Mankind (1975).
5. Agreement on trade-related aspects of intellectual property rights (1994).⁷
6. The WIPO Copyright Treaty (1996).
7. Geneva Declaration on the Future of the World Intellectual Property Organization (2004).

The Universal Declaration Human Rights (UDHR)

Protection for freedom of expression is widely identified as important in promoting access to knowledge by the Universal Declaration Human Rights (hereinafter 'the UDHR'). According to Article 19 of the UDHR the right to freedom of expression includes

⁴ Sri Lanka acceded to UDHR in 1948.

⁵ Sri Lanka acceded to ICESCR in 1980.

⁶ Sri Lanka acceded to the Berne Convention in 1959.

⁷ Sri Lanka acceded to TRIPs in 1995.

...freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.⁸

The importance of the right to access to knowledge is that freedom of expression protects the ability to communicate existing knowledge to new parties. Likewise, freedom of expression enables collaboration for the development of new knowledge.

Article 27 (1) of the UDHR emphasizes the public interest aspect of copyright. It states that

Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and share in scientific advancement and its benefits.

Article 27(2) of the UDHR states that,

Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

The International Covenant on Economic, Social, and Cultural Rights (ICESCR)

Article 15(1) iii of the International Covenant on Economic, Social, and Cultural Rights (hereinafter 'ICESCR') recognizes that the

⁸ "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers:"

right of everyone to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.⁹

The Berne Convention for the Protection of Literary and Artistic Works ¹⁰

The Berne Convention for the Protection of Literary and Artistic Works (hereinafter 'the Berne') is the most important of the international copyright agreements. The objective of the Berne Convention is to safeguard the rights of authors in their literary and artistic works, by establishing minimum standards of protection.¹¹ The Berne convention permit countries to establish a number of limitations and specific and general exceptions, aimed at allowing particular kinds of use of protected works for an overriding public interest.¹²

⁹ Article 15(1) states that the States Parties to the present covenant recognize the right of everyone:

- i. To take part in cultural life;
- ii. To enjoy the benefits of scientific progress and its applications;

Article 15(2) The steps to be taken by the States Parties to the present Covenant to achieve the full realization of this right shall include those necessary for the conservation, the development and the diffusion of science and culture.

Article 15 (3) The States Parties to the present Covenant undertake to respect the freedom indispensable for scientific research and creative activity.

¹⁰ This is revised several times and lastly at Paris in 1971 and commonly known as "the Paris Act of Berne".

¹¹ Article 18 of the Berne Convention expressly mentions the "public domain" without defining it.

¹² For instance Article 9 and 10 of the Berne Convention .

The Declaration on the use of scientific and technological progress in the interests of peace and for the benefit of mankind

The Declaration on the use of Scientific and Technological Progress in the Interests of Peace and for the Benefit of Mankind emphasises the balance that is to be maintained between scientific development and its misuse.¹³

All States shall take measures to extend the benefits of science and technology to all strata of the population and to protect them, both socially and materially, from possible harmful effects of the misuse of scientific and technological developments, including their misuse to infringe upon the rights of the individual or of the group, particularly with regard to respect for privacy and the protection of the human personality and its physical and intellectual integrity.

Although this instrument is directly related to scientific and technological progress, yet it categorically recognises protection of intellectual integrity and human personality.

Agreement on trade-related aspects of intellectual property rights (TRIPs)

The Agreement on trade-related aspects of intellectual property rights (hereinafter 'TRIPs') Agreement establishes minimum standards for the protection of authors, broadcasting organizations,

¹³ United Nations' General Assembly Resolution 3384 (XXX) of 10.11.1975

performers and phonogram producers. Article 7 of the TRIPs Agreement states that

The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and *to a balance of rights and obligations* (emphasis added)."

WIPO Copyright Treaty

Preamble, WIPO Copyright Treaty states that

...the need to *maintain a balance* between the rights of authors and the *larger public interest*, particularly education, research and *access to information*, as reflected in the Berne Convention (emphasis added)".

Geneva declaration on the future of the WIPO (2004)

The necessity of access to knowledge is emphatically recognised by the Geneva Declaration as follows.

- moratorium on creation of new treaties that expand monopolies and restrict access to knowledge;
- WIPO should address the civil society concerns e.g. consumer rights, libraries, blind and visually impaired people;

- support for WIPO Development Agenda and a Treaty on Access to Knowledge.¹⁴

Constitutional recognition of copyright in Sri Lanka

Constitution of a country is the fundamental source of the law of that country. Access to knowledge has a paramount important role in Sri Lanka like in other countries specially while meeting her Constitutional obligations. The Preamble to the Constitution of Sri Lanka, 1978 (hereinafter 'the Constitution of Sri Lanka'), recognises, among other things, the fundamental human rights and creation of free and just society.¹⁵

Furthermore, the Constitution of Sri Lanka guarantees freedom of expression as a fundamental right. Article 14(1) (a) provides that

¹⁴ 'There must be a moratorium on new treaties and harmonization of standards that expand and strengthen monopolies and further restrict access to knowledge. For generations WIPO has responded primarily to the narrow concerns of powerful publishers, pharmaceutical manufacturers, plant breeders and other commercial interests. Recently, WIPO has become more open to civil society and public interest groups, and this openness is welcome. But WIPO must now address the substantive concerns of these groups, such as the protection of consumer rights and human rights. Long-neglected concerns of the poor, the sick, the visually impaired and others must be given priority.'

¹⁵ The PEOPLE OF SRI LANKA having, by their mandate freely expressed and granted on the day of the waxing moon in the month of Adhi Nikini in the year two thousand five hundred and twenty-one of the Buddhist era ...entrusted to and empowered their representatives elected on that day to draft and operate a new Republican constitution in order to achieve the goals of a DEMOCRATIC SOCIALIST REPUBLIC, ... and assuring to all people FREEDOM, EQUALITY, JUSTICE, FUNDAMENTAL HUMAN RIGHTS and the INDEPENDENCE OF THE JUDICIARY the intangible heritage that guarantee the dignity and well being of succeeding generations of the people of SRI LANKA, ...who come to share with those generations the effort of working for the creation and preservation of a JUST AND FREE SOCIETY.

Every citizen is entitled to “the freedom of speech and *expression including publication* (emphasis added).

Right to freedom of expression includes the freedom of discussion and dissemination of knowledge. As observed in *Joseph Perera Alias Bruten Perera v. The Attorney-General and Others*

Freedom of speech and expression means the right to express one’s convictions and opinions freely by word of mouth, writing, printing, pictures or any other mode. It includes the expression of one’s ideas through banners, posters, signs etc. It includes the freedom of discussion and dissemination of knowledge. It includes freedom of the press and propagation of ideas ...¹⁶

Article 15(7) of the Constitution of Sri Lanka recognises restriction on fundamental rights. It states that ...the exercise and operation of fundamental right declared and recognised by Article... 14 shall be subject to such restrictions as may be prescribed by law in the interests of protection of...morality, or for the purpose of securing due recognition and respect for the rights and freedoms of others, or of meeting the just requirements of the *general welfare of a democratic_society*. (emphasis added)

Article 27 of the Constitution of Sri Lanka, which deals with Directive Principles of state policy and fundamental duties, also recognizes the above mention fundamental principle. Article 27 (2) of the Constitution of Sri Lanka stats that the State is pledged

¹⁶ [1992]1 S.L.R.202.

to establish in Sri Lanka a democratic socialist society, the objectives of which include –

- (e) the equitable distribution among all citizens of the material resources of the community and the social product, so as best to subserve the common good ;
- (h) the complete eradication of illiteracy and the assurance to all persons of the right to *universal and equal access to education at all levels* (emphasis added).

Article 27 (9) of the Constitution of Sri Lanka states that the State shall ensure social security and welfare. According to Article 27 (10) of the Constitution of Sri Lanka, the State shall assist the development of the cultures and the languages of the People.

PART TWO

Statutory recognition of copyright

As it is well known, copyright exists only because the law has recognised it. It is commonly recognized that the statutory recognition of copyright began in 1908 with the promulgation of Copyright Ordinance, No.12 of 1908.¹⁷ However, Intellectual Property Act No.36 of 2003 (hereinafter ‘the 2003 Act’) today governs copyright law in Sri Lanka. In order to address the main theme of this research article, right to intellectual property against right to access to knowledge, three main areas should be considered.

¹⁷ However, the Author of this reach article vehemently ejects this claim since there are statutory evidences to rebut this common understanding.

Firstly, the scope of copyright protection. Secondly, the duration of copyright protection. Thirdly, the limitations and exceptions.

Scope of the copyright protection

Scope of the protection given to copyright plays a vital role in determining the rights of the owner of copyright as well as the right of the public to access to information. Scope of the copyright protection can be examine under two areas namely scope of subject matter coverage and statutory rights to control use.

Scope of subject matter coverage

In terms of section 6 of the 2003 Act, copyright protection is given to original intellectual creations in the literary, artistic and scientific domain.¹⁸ Unlike in the United Kingdom and few other countries,

¹ Section 6 (1) of the 2003 Act states that "The following works shall be protected as literary, artistic or scientific work (hereinafter referred to as "works") which are original intellectual creations in the literary, artistic and scientific domain, including and in particular—

- (a) books, pamphlets, articles, computer programs and other writings ;
- (b) speeches, lectures, addresses, sermons and other oral works ;
- (c) dramatic, dramatic-musical works, pantomimes, choreographic works and other works created for stage productions ;
- (d) Stage production of works specified in paragraph (c). and expressions of folklore that are apt for such productions ;
- (e) musical works, with or without accompanying words ;
- (f) audiovisual works ;
- (g) works of architecture ;
- (h) works of drawing, painting, sculpture, engraving, lithography, tapestry and other works of fine art ;
- (j) photographic works ;
- (k) works of applied art ;
- (l) illustrations, maps, plans, sketches and three dimensional works relative to geography, topography, architecture or science.

fixation in some material form and/or registration is not prerequisites for protection under the Sri Lankan Law. Therefore, copyright subsists automatically in a work if and when the conditions for subsistence are met.¹⁹ The scope of the copyright protection is extended to derivative works as well.²⁰

Statutory rights to control use

The 2003 Act provides two groups of rights to the creators. The first group of rights is economic rights. Economic right is the right to control the use of their work. This right includes exclusive right to exclude others from using those works including reproduction

¹⁹ Section 26 of the 2003 Act, states that the protection of literary, artistic or scientific works shall apply to :

- (a) Works of authors who are nationals of, or have their habitual residence in Sri Lanka.
- (b) Works first published in Sri Lanka, works first published in another country and hereupon published in Sri Lanka, within thirty days from such publication, irrespective of the nationality or residence of their authors.
- (c) Works that are protected in Sri Lanka by virtue of, and in accordance with, an international convention or any agreement to which Sri Lanka is a party.

²⁰ Section 7(1) of the 2003 Act states that

- (a) translations, adaptations, arrangements and other transformations or modifications of works ; and
- (b) collections of works and collections of mere data (data bases), whether in machine readable or other form, provided that such collections are original by reason of the selection, co-ordination or arrangement of their contents.

of work.²¹ In terms of section 5 of the 2003 Act, the reproduction right covers electronic reproduction.²² Likewise, the rights given to the creators apply to both the entire work and a substantial part thereof.²³

The second group of statutory rights is moral rights. This right mainly recognises the authors' right to be identified as the author of their work.²⁴

²¹ Section 9 (1) of the 2003 Act provides that the owner of copyright of a work shall have the exclusive right to carry out or to authorize the following acts in relation to the work (a) reproduction of the work; (b) translation of the work; (c) adaptation, arrangement or other transformation of the work; (d) the public distribution of the original and each copy of the work by sale, rental, export or otherwise; (e) rental of the original or a copy of an audiovisual work, a work embodied in a sound recording, a computer program, a data base or a musical work in the form of notation, irrespective of the ownership of the original or copy concerned; (f) importation of copies of the work, (even where the imported copies were made with the authorization of the owner of the copyright); (g) public display of the original or a copy of the work; (h) public performance of the work; (j) broadcasting of the work; and (k) other communication to the public of the work.

²² Section 5 of the 2003 Act states that "reproduction" means the making of one or more copies of a work or sound recording in any material form, including any permanent or temporary storage of a work or sound recording in electronic form.

²³ Section 9 (2) of the 2003 Act.

²⁴ Section 10 (1) of the 2003 Act. The author of a work shall independently of his economic rights and even where he is no longer the owner of those economic rights, have the following rights :—

- (a) to have his name indicated prominently on the copies and in connection with any public use of his work, as far as practicable
- (b) the right to use a pseudonym and not have his name indicated on the copies and in connection with any public use of his work ;
- (c) to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, his work which would be prejudicial to his honour or reputation.

Duration of copyright protection

Copyright is given for only a fixed period. It is only when copyright expires that the work enters the public domain. Hence, the term of protection given to copyright is crucial to establishing an adequate balance between the copyright owners' rights and the public interests on access to knowledge in copyright work.

Under Sri Lankan copyright law, duration of copyright has been significantly expanded throughout the history. For instance, protection granted for the works in general for author's lifetime and further period of fifty years from the date of his death. This is extended up to 70 years under present law.²⁵

²⁵ Duration of copyright under Intellectual Property Act No. 36 of 2003

<i>Copyrights in</i>	<i>Duration of economic</i>
Works in General	Life time + 70 years
Joint authorship	Life of the last surviving author and 70 years from his death
Collective work	70 years from the date on which the work was first published, if it is not published then 70 years of the making the work
Anonymous or pseudonyms	70 years from the date on which the work was first published
Applied art	25 years from date of the making the work
Broadcasting organization	From the moment, broadcasting takes place until the end of 50 th calendar year.
Performers	From the performance until 50 th calendar year
Sound recording	From the date of publication until 50 th calendar year, if not published from the date of fixation until 50 th calendar year

Limitations and exceptions

In general, copyright does subsist in any works that go against the public morality. There is no provision in the incumbent copyright law in Sri Lanka, which restricts or denies copyright protection for a work, which involves public deception. However, the creator of such immoral work would become liable under some other laws such as Criminal Law, Obscene Publication Act.²⁶ Moreover, the copyright does not extend to certain kinds of subject matter such as ideas, official texts of a legislative etc.²⁷

Statutory permissions to copy

An act would amount to an infringement of copyright only when one violates the protected rights of an author. It is clear from reading section 5 of the 2003 Act²⁸ with section 9(1) of the 2003 Act that a person infringes copyright in protected subject matter under two situations.

Firstly, if he himself exercises one of the exclusive rights of an author in relation to the whole work or a substantial part thereof, without the consent of the owner of copyright. Secondly, if he

²⁶ E.g. sections 285 and 286 of the Penal Code of Sri Lanka, No.2 of 1883.

²⁷ According to section 8 of the 2003 Act copyright protection is not extended to -

- (a) to any idea, procedure, system, method of operation, concept, principle, discovery or mere data, even if expressed, described, explained, illustrated or embodied in a work ;
- (b) to any official text of a legislative, administrative or legal nature, as well as any official translation thereof ;
- (c) to news of the day published, broadcast, or publicly communicated by any other means.

²⁸ Section 5 of the 2003 Act states that "infringement" means an act that violated any right protected under Part II of the 2003 Act (which provide copyright protection).

authorises any other person to exercise one of the exclusive rights of the copyright owner, in relation to the whole work or a substantial part thereof, without the consent of the owner of copyright.²⁹

However, certain "uses" of a copyrighted work are allowed without the copyright owner's permission. This is known as 'fair use' or 'permitted use'. The rationale behind the recognition of such concept is to maintain a balance between the protection of legitimate economic and moral interests of copyright owners and the protection of the users to have access to, and some use of, such works in order to pursue new research and expand human knowledge.

Fair use

The 2003 Act does not define the phrase 'fair use'³⁰. Hence, it can be argued that there is no "right" which guarantees immunity against legal action for copyright infringement. However, it is generally assumed fair use as legal "defence" for copyright infringement.

The 2003 Act provides four factors, which are to be considered in order to determine whether an act would amount to fair use, as opposed to an infringement of copyright:³¹

²⁹ The argument of *CBS Songs Ltd v Amstrad Consumer Electronics plc* (1988) R.P.C 567 would be guided. Also *Microsoft Corporation v Computer Future Distribution Limited* [1998] ETMR 597. In this case, the defendant was found liable under Copyright Designs and Patent Act, 1988 (UK), for having authorised others to copy Microsoft software.

³⁰ However, section 11(1) of the 2003 Act states that the fair use of a work, including such use by reproduction in copies or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship or research, does not infringe copyright.

³¹ Section 11(2) of the 2003 Act

1. purpose and character of the use,
2. the nature of copyrighted work,
3. the amount and substantiality of the portion used,
4. the effect of the use for the potential market, or value of copyright.³²

Furthermore, section 5 of the 2003 Act³³ provides a definition for the term 'publish'. However, not distinguish between published and unpublished works. Hence, the Application of 'fair use' for unpublished work is not clear under the 2003 Act However, hether a work is published or unpublished should be a crucial element to determine the application of fair use under the 2003 Act.

Likewise, the 2003 Act contained a number of statutory provisions with regard to fair use exceptions.³⁴ The proceeding part of this study examines fair use exception relevant to librarians and information managers.

³² These factors resemble, the list of such factors contained in section 107 of the USA legislation.

³³ According to section 5 of the 2003 Act "published" means a work or a sound recording

(a) copies of which have been made available to the public in a reasonable quantity for sale, rental, public lending or for transfer of the ownership or the possession of the copies ;or

(b) which has been made available to the public by means of an electronic system : Provided that, in the case of a work, the making available to the public took place with the consent of the owner of the copyright, and in the case of a sound recording, with the consent of, the producer of the sound recording or his successor in title

³⁴ See section 12 of the 2003 Act

PART THREE

Library Exception

Uses of protected works by libraries, archives etc has been seriously threatened under present copyright law. Nevertheless, copyright exception should be interpreted in accordance with their underlying justification. This equally applies to library exception, which aimed at promoting learning, culture and science. The Foundation of Library Exceptions can be seen in three major international instruments and Model Law.

A. The Berne Convention

B. TRIPs.

C. The WIPO Copyright Treaty (WCT).

D. Tunis Model Law on Copyright for Developing Countries

A. The Berne Convention

The Berne Convention does not categorically mention libraries or archives among the allowable exceptions. However, the authority under Berne to adopt a library exception is founded on Article 9(2). Article 9(2) of the Berne convention declares that

It shall be a matter for legislation in the countries of the Union to permit the reproduction of such works in certain special cases, provided that such reproduction does not conflict with a normal exploitation of the

work and does not unreasonably prejudice the legitimate interests of the author.³⁵

B. TRIPs.

Article 13 of the TRIPs states that:

Members shall confine limitations or exceptions to exclusive rights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right holder.

Although the Berne provides exception to the reproduction right, Article 13 of the TRIPs permits exceptions to any of the owner's rights.

C. The WIPO Copyright Treaty (WCT).

Article 10(1) of the WCT provides that

Contracting parties may, in their national legislation, provide for limitations of or exceptions to the rights granted to authors of literary and artistic works under this Treaty in certain special cases that do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the author.

³⁵ Generally this is known as Berne three-step-test which allows national legislation to provide statutory exceptions within the bounds of the three criteria: (1) certain special cases; (2) no conflict with normal exploitation of the work; and (3) cannot unreasonably prejudice the author's interests.

Article 11 of the WCT provide for the prohibition against circumvention of technological measures:

Contracting parties shall provide adequate legal protection and effective legal remedies against the circumvention of technological measures that are used by authors in connection with the exercise of their rights under this Treaty or the Berne Convention and that restrict acts, in respect of their works, which are not authorized by the authors concerned or permitted by law.³⁶

D. Tunis Model Law on Copyright for Developing Countries

The reproduction, by photographic or similar process, by public libraries, non commercial documentation centres, scientific institutions and educational establishments, of literary, artistic or scientific works which have already been lawfully made available to the public, provided that such reproduction and the number of copies made are limited to the needs of their activities, do no conflict with the normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the author. . . .

All the above-mentioned instruments shows the recognition of library exception one or the other

³⁶ Prohibition against circumvention of technological measures seriously affects to library exception. This will be dealt in the preceding.

form. The exceptions for copyright including the library exceptions are based in large part on the requirements and provisions of the Berne Convention and other multinational agreements. Indisputably, those instruments must have moulded the existence and the shape of library exceptions in Sri Lanka. Hence, it is necessary to examine the library exceptions recognised by incumbent copyright law in Sri Lanka to assess whether those exception are facilitating or impeding the function of librarians and information managers.

Library Exception in Sri Lanka

Library exception³⁷ in Sri Lankan copyright law cannot be significantly differing from that of International Instruments. At present the library and archive exceptions fall within three main categories

- (a) Reproduction for a user for the purposes of research or study or reproduction for another library;
- (b) Reproduction of unpublished works in library collections;
- (c) Reproduction for the purpose of preservation or in the event of loss or theft.

These categories of exceptions are mainly concerned about reproduction rights. However, it should not forget that other rights of the owner also have significant impact on library exception.

³⁷ The term "library" or "archive" is not defined by the 2003 Act.

Hence, a detail discussion of all these three categories is warranted since it could reveal whether Sri Lankan library exceptions is capable of achieving the balance between the copyright owners right and public rights to access to knowledge.

(a) Reproduction for a user for the purposes of research or study or reproduction for another library

In relation to copying for a user for the purposes of research or study or copying for another library is recognises by the section 12 (5) of the 2003 Act subject to certain conditions.

Exception for general library copying

According to section 12 (5) of the 2003 Act, following conditions should be satisfied in order to reproduce a work without detailing the purpose.

♦ **Eligible institutions**

Under the Act 2003 not all libraries and archive qualifies to use general library exception. However, library or archives whose activities do not serve any direct or indirect commercial gain are eligible for this exception. This requirement is very important since it qualifies which members of the public will have the benefits of the library activities.³⁸

³⁸ This is a seriously impediment to rights of the Open University of Sri Lanka.

- ◆ **Nature of reproduction**

According to section 12 (5) of the 2003 Act reproduction is confined to reprographic reproduction such as photocopying only.³⁹ It does not deal with the other reproduction mechanism such as digital reproduction.

- ◆ **Scope of work**

The 2003 Act does not allow reproduction of all or nearly all types of works. It allows only reproduction of textual works such as books and articles. This is clear from the wording of the provision that use the phrase 'reprographic reproduction'. Hence, is clear that audio-visual works,⁴⁰ artwork, computer programs, motion pictures etc cannot be reproduced under this exception.

- ◆ **Number of copies**

The Act 2003 allows reproduction of single copy. Multiple copies are not allowed. This would seriously affect to institutions like Open University where the Librarian has to provide equal access to libraries at regional centres.

The above conditions show that library and archives can reproduce works subject to conditions. However, it should be noted that under no circumstances library or archive could making available to the public of a work, in such a way that members of the public may

³⁹ "Reprography" generally refers to reproduction in printed form.

⁴⁰ According to section 5 of the 2003 Act "audiovisual work" means a work that consists of a series of related images which impart the impression of motion, with or without accompanying sounds, susceptible of being made visible, and where accompanied by sounds susceptible of being made audible.

access them from a place and at a time individually chosen by them make since it violates owners right to public distribution and right to communication to the public.

Exception for copies for research or study

According to section 12 (5) (a) proviso 1 of the 2003 Act, published article, other short work or short extract of a work can be reproduced for research or study when such reproduction satisfies the following conditions.

- ◆ **Nature of work**

This exception restrict only to published work. According to section 5 of the 2003 Act "published" with regard to work means 'copies of which have been made available to the public in a *reasonable quantity for sale, rental, public lending or for transfer of the ownership or the possession of the copies* (emphasis added). Hence, libraries and archives cannot use this exception to reproduce unpunished works as well as work which does not satisfy the definition of published.

- ◆ **On whose request**

In order to use this exception the request must be made by a physical person. Hence, librarians are not allowed make reproduction on the request of a physical person such as an institution.

- ◆ **Number of copy - Single copy can be reproduced**

- ♦ **For what** - To fulfil the user's request
- ♦ **Proof of user's purpose**

No proof is needed to prove that the reproduction is made for study, scholarship or private research.

- ♦ **Librarian's knowledge**

The library or archive must satisfy that the copy will be used solely for the purpose of study, scholarship or private research and for no other purpose. It is questionable as to what kind of test should be used to determine the knowledge of the librarian when the right owner challenges such reproduction.

(b) Reproduction of unpublished works in library collections

The discussion made under the title of 'Exception for general library copying' would equally apply to reproduction of unpublished works in library collections.

(c) Reproduction for the purpose of preservation or in the event of loss or theft

Preservation and replacement involves the making of copies of a work before it has been lost, destroyed etc for any reason, in order to ensure its continued availability. However, section 12 (5) (b) of the 2003 Act makes some conditions upon making of such copies.⁴¹

⁴¹ 12 (5) (b) where the copy is made in order to preserve and, if necessary replace a copy, or to replace a copy which has been lost, destroyed or rendered unusable in the permanent collection of another similar library or archives: Provided that it is not possible to obtain such a copy under reasonable conditions; and Provided further, that the act of reprographic reproduction is an isolated occurrence occurring if repeated, on separate and unrelated occasions.

- ♦ **Number of copies** - Only a single can be reproduced.
- ♦ **Mode of reproduction**

The 2003 Act allows only reprographic reproduction for preservation and replacement. Hence, reproduction of audio-visual works, slides etc cannot be reproduced.

- ♦ **Location of the work**

The 2003 Act provide a restriction that copy of work currently available in the library or archive.

- ♦ **Permanency**

This means that the work should be in the permanent collection of the library or archive. Hence, it restricts reproduction of work borrowed from user or any other person / institute.

Circumstances of the original work

The original work must be lost, destroyed, damaged, or rendered unusable when the reproduction is taken place in order to give to another similar library or archive.

- ♦ **Availability**

Reproduction under this exception can be made only when the work is not available on market for purchase under reasonable conditions.

- ♦ **Reproduced work**

The copy, which is reproduced under this exception, should become a permanent part of the collection.

Document supply or interlibrary loan

It is widely recognised the making and sending copies of materials under interlibrary loan for facilitating access to materials from other libraries around the country. Generally, journal articles are common to this kind of practice. With the development of digital technology, this is extended to digital copies as well. However, there is no provision under Sri Lankan copyright law. In terms of section 12(5) (a) of the 2003 Act reproduction of a published article, other short work or short extract of a work can be made to satisfy the request of a physical person. Hence, interlibrary loans are seriously challenged under Sri Lankan copyright law.

Circumvention of Technological Protection Measures

As it is mentioned earlier due to the technological protection measures, users cannot or restricted to access and make use of certain work. Under Sri Lankan copyright law, it is prohibited to circumvent such technological protection of a work. Section 23(1)(i) of the 2003 Act provides that

the manufacture or importation for sale or rental of any device or means specifically designed or adapted to circumvent any device or means intended to prevent or restrict reproduction of a work or to impair the quality of copies made (the latter device or means hereinafter referred to as "copy protection or copy management device or means")

Hence, under no circumstances library or archives can circumvent technological protection used for copyright works

Legal deposit.

It is most common requirement that a deposit should be made of all published works with the national library or national archive.⁴² However, this issue can be overlapped with the library exceptions. For example, when a library make a copy, in order to make a copy of a work, which is not in the collection, but to meet the legal deposit requirement. That is not covered by the 2003 Act.

Library services for the visually impaired.

Under the 2003 Act, it is not allowed libraries to make and retain formats of works that serve the needs of persons who are blind or visually impaired. It is seriously affect to the constitutional mandate, which declares that

‘the complete eradication of illiteracy and the assurance to all persons of the right to universal and all persons of the right to universal and equal access to education at all levels’⁴³

This issue is the subject of a separate report from WIPO, issued in 2007.⁴⁴

⁴² See National Archives Law No. 48 of 1973.

⁴³ Article 27(2)(h) of the Constitution of Sri Lanka

⁴⁴ For the full report, see: http://www.wipo.int/meetings/en/doc_details.jsp?doc_id=75696.

PART FOUR

Conclusion

The above discussion reveals that the existing copyright law in Sri Lanka is a serious threat not only for access and dissemination of knowledge but also for the core functioning of institutions key to the Information Society specially libraries, archives, museums. Sri Lanka, being a developing country with a distributed population, should have access to important knowledge-based products as the country seeks to bring education to all, facilitate research, improve competitiveness, protect cultural expressions, and reduce poverty.

It is the duty of the Legislature of the country to ensure that society has access to ideas and knowledge generated by others. However, the provision with regard to library exception ultimately challenges the validity of the directive principles of state policy embodied in the Constitution where the state is pledged to assure to all persons the right to universal and equal access to education at all levels.⁴⁵ Hence, it is need of the day to revisit the copyright law in Sri Lanka.

It is up to the librarians and information managers in Sri Lanka to decide whether they qualifies for the exception and hence can render their service to the country, or whether they need to take steps towards the correct direction which ensure help the public of right to access to knowledge.

⁴⁵ Art.27(2)(h).

Knowledge management and its role in the changing environment of Central Banks

Tharangi Wijeratne

Abstract:

This paper intends to provide the reader with a perception of the role of knowledge management (KM) in building corporate capabilities in the inevitable changing environment of central banks, and to discover the ways and means of creating the knowledge environment. The study exposed that many central banks are still at the infancy stage of the implementation of the KM, while some are progressing along the road map of KM maturity. Further, It was revealed that central banks prefer employees to develop their skills, to build their future together with the organisation.

Introduction

Success of a central bank decisively lies on its knowledge accessibility and capabilities that are essential to identify and

manage the changing environment. However, long established nature of protecting a country's economy was necessitated central banks to concentrate on achieving the set of objectives. The need for accountability and transparency in terms of monetary policy as well as managing organisational resources effectively reflect the operational independence that many central banks have been granted in the recent past.

This situation demands central banks to consider new management practices in order to manage its resources efficiently and effectively. to be successful in future. Few central banks have successfully embedded the Knowledge Management (KM) mechanisms in their processes to deal with the changes. Consequently, exploring the role of KM in central banks was seen as a valid area to address. These strategic changes give the opportunity to create the knowledge environment that needs to nurture the competences and technical infrastructure together with social environment, through the implementation of 'Knowledge Management', so that, this study is sought to explore the ways and means of applying KM in central banks.

Changing environment of Central Banks

It is an obvious fact that the central banks play a significant role in the ever expanding economies and societies all over the World with these specific and significant functions. From the history of the central banks, it is known that they are inherent as well as enduring organisations in a national economy. Yet, there is no given assurance for a central bank to stay forever, though they are strong and powerful in nature (Menzela, 2005).

Moreover, as change is constant, a central bank that has the capability of changing according to the environment and the conditions in the market, will lead to its success. Hence, "those central banks that are prepared to actively take up the challenge of internal change are the ones most likely to achieve continued relevance, independence and influence in the 21st century"¹ (Lang, 2004).

Menzela (2005) elaborates on the development of a hypothetical central bank through three ages. In the first age, central banks originated with an emphasis on operations to support governments, the institutions through their specific functions. Being bureaucratic and civil service organisations, the main concern was to be effective. Hence higher officials took the role of command and control in order to be capable administrators.

Then, in the second stage, it was required to handle policy functions like a nation's foreign reserves management, development and implementation of monetary policy, regulation and supervision of banking and financial institutions and consultancy on economic development. As broader knowledge and expertise is required to carry out these functions, that first age bureaucratic features turn out to be flawed over business skills and diversity of opinions and free expressions that became indispensable. The redundancies of the staff have taken place as a result of functional and technological changes, while remuneration structures represent the economic value of the service and not the period that employees serve.

¹ Brian Lang, representing the Reserve Bank of New Zealand at the 2004 currency Conference in Rome).

Next, at the third age which is still emerging, as information and communications technology advances the global knowledge economy, central banks will focus on operational functions that are only specific to them and will be highly technical with less staff. Consequently, it will require changing the second-age organisation structures and management practices. Moreover, with granting of operational independence, central banks need to manage its resources effectively, particularly the human resources.

Demand for new management practices

Though the central banks are supposed to be functioned strategically, they mostly rely on centralised management. However, the life time carrier structures which emphasise control, experience and hierarchy, are encouraged with their centralised, bureaucratic management style. As the new pressures for changes began to rise, central banks recognise that their "traditional organisational structures and management practices are not well matched to the type of learning that needs to occur" (Mendezela, 2005). The demands such as;

- need of sharing tasks with other central banks shows the importance of more open structures
- exchanging people and ideas with expertise in other organisations
- creative, team-based environments in order to get substantial and recognised personal contribution in achieving objectives
- emphasis on goals and performance with a more open-ended approach to knowledge management
- core skills as project sponsorship and management

- careers supported with creatively facilitated movements within the central bank and to and from the outside world
- increasing dependency of coordinating activities in an environment where you maintain good relationships rather than in hierarchical authority
- careful thought and innovation in investments in training and development and capability planning instead of succession planning

raise the issues having applied the new management practices.

Knowledge management in Central Banks

Few central banks have already implemented knowledge management (KM) practices as a part of their corporate services mostly combining human resources, Information management and Information Technology services in order to build the corporate capabilities that are required to strengthen their future. KM has an important role in central banks being the knowledge based organisations, knowledge visibility, accessibility and reuse are becoming more important to increase the talent demanded by the knowledge economy. This ever increasing process has made central banks attempt to capture strategic knowledge as much as possible and distribute it efficiently to reduce redundancy and enable to create innovative solutions to meet the core objectives (Bank Negara Malaysia Annual Report 2006, pp. 125-126).

Explaining knowledge management

Knowledge management (KM) is not straightforward in nature as one of the steps is the extraction of the sticky (tacit) knowledge from individuals (Denning 2000). Some consider KM as a

“conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strives to improve organisational performance” (O’Dell & Grayson 1998, p. 4). In contrast to that, some regard knowledge as a different asset from other corporate assets and they argue that knowledge assets cannot be managed in a similar way of managing other conventional corporate assets (Firestone & McElroy 2003, pp. 60-86). Therefore, the definition is vague and varies according to the environment. It is worth to distinguish the terms Information vs knowledge and tacit vs explicit knowledge, before exploring these practices and approaches in terms of solutions to changing environment.

Knowledge Vs Information

The simplest definition of knowledge is “what people know” whereas information is the format that they communicate knowledge among them (Abell & Oxbrow 2001, p.73). As Nonaka, Toyama & Konno (2000, p. 25) point out, information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals. In other words, knowledge is created as the result of the interaction between people and information. (Abell & Oxbrow 2001, p. 71; Davenport & Prusak 1998, p. 6).

Explicit vs. Tacit knowledge

In order to understand the difficulty in transferring and capturing the knowledge, it is worth examining the forms in which it exists. Polyani’s view of the knowledge’s existence in tacit and explicit is the widely accepted view which is further explained by Nonaka.

He explained that tacit knowledge is "highly personal, hard to formalise and difficult to communicate to others." Moreover, it is "deeply rooted in action, commitment, and involvement in a specific context" (Nonaka 1994, p.16). Whereas explicit knowledge is "formal, systematic and can be easily communicated and shared in product specifications or a scientific formula or a computer program" (Nonaka, 1991).

Transferring of explicit knowledge relatively takes place in an organisation as the employees share reports, financial budgets, policies, manuals, etc. On the other hand tacit knowledge has to be converted into explicit knowledge for the purpose of sharing. This conversion has to be done without losing the context of the tacit knowledge which is so difficult due to many reasons like difficulty in expressing, uncertainty, continuous changing nature, context-dependency, cost and politics (Newell et al. 2002, pp 105-6).

Organisational change

The knowledge based economy expands by the never-ending growth of information and communication technology (ICT), and leads the way to the globalisation which causes the swift change in the private and public sector organisations. The success of an organisation totally relies on its ability to operate in this fast changing and globalising market place. This change, as believed by many, not only poses the challenges, but also it gives the opportunities specifically to the public sector to gain effectiveness as well as competitive advantage for their survival.

As central banks are not exposed to competition and have their own budgetary control, the drivers of organisational change are

naturally weaker than other public sector bodies. And central banks are "rarely described by outside observers as efficient in their operations" (McKinley & Banaian 2005, P. 1). But this situation changes rapidly. Unlike in the past, it is a risk for central banks to stay without building their capabilities to face the changing surroundings. Since mid 1990s, more efforts and resources are being utilised to enhance the efficiency and effectiveness of central banks in long term as "these unique organisations reliant on market reputation and public confidence (Menzela, 2005).

Further he points out that the rapidly changing world and the global 'war for talent' will make central banks pay greater attention to best management practices.

Managing change

The environment that organisations exist in and work in are changing, and organisations face the challenge of developing their organisational capabilities to face this change. It is being explored far beyond from using the balance sheet and financial accounting as the main tools of management to identifying the resources that create value as well as assist success in achieving organisational objectives. Further, they find ways and means to make sure the assets, such as human or knowledge workers can work effectively together by sharing their knowledge (expertise, experiences, methods etc.,) in order to compete in the competitive and global market. Eventually, the organisations which are capable of mobilising knowledge faster than their rivals will prosper keeping others far behind.

Central banks in the growing economies have many opportunities to apply innovative management concepts to get maximum benefits by redirecting the ways of utilising its resources. As central banks exist to serve the country's economy and society, it is expected that a central bank will remain relevant, effective and efficient organisation in a changing environment. Hence employees should be given an awareness on the value of change and learn to deal with it in order to avoid their hesitation for the change.

Developing capabilities

There are many modifications that are taking place in order to develop the organisational capabilities like global management, virtual offices, and flatter management structures. During the last four decades, many management techniques such as total quality management, business process re-engineering, total productive maintenance and empowerment shape the focus to the need of individuals' commitment to their roles in organisations.

In late 1990s, KM entered into the scene and gained recognition as the most influential management philosophy. Saint Onge (1999 *In Abell & Oxbrow 2001, p. 7*) argues that it is essential to apply KM concepts, if the organisation wants to lead its market than just managing to cope up demands. He believes, "corporate capability is the integration of strategy, structure, systems and culture" (Abell & Oxbrow 2001, p. 8)

In today's organisation, as knowledge economy advances, it has become an essential requirement to build the capability of recognising the signals of change and as well as flexibility and agility to get adapt to change quickly. It is envisaged that central

banks are paving their way to build their capabilities by applying KM concepts to inspire and facilitate innovation, to make sure that they use lessons learned either from success or failure, and give them the opportunity of totally new ways of working. The governor of Bank Negara Malaysia (Central Bank of Malaysia) points out this need giving importance to the knowledge as key organisational asset, at the official launch of 'Towards Knowledge-based Organisation' in October 2000,

"If we are to be a central bank, with farsightedness and an ability to face new challenges, we need to be equipped with the expertise and the means to implement appropriate policies, and have confidence in our actions. An important component of this future is that the Bank must fully embrace and employ the principles of knowledge management. Whilst the principal objectives of the central bank remain unchanged, the new knowledge management strategies refocus the Bank's policies and practices in managing knowledge as a key corporate asset, and in leveraging and exploiting knowledge to better achieve these objectives".

Knowledge based organisations

The ultimate aim of applying KM in building organisational capabilities is to convert the organisation into a knowledge based organisation. Hence, before comprehending the process of exploring possible KM approaches to inculcate activities of a knowledge based organisation, it is vital to have clear consideration of constitutes of such organisations. While it is obvious that knowledge is the primary resource of these organisations, Sveiby (1999) depicts the other features as follows:

- In these organisations knowledge flows are considered more imperative than financial flows and people are regarded as revenue creators and not as cost items;
- Customer relations are considered as partnerships in which solutions are co-created and knowledge flows both ways;
- Knowledge workers have more power than management due to the fact that they have more knowledge on the technical field, have a better feel for the market and are closer to the customers;
- The primary production factor is creativity of the staff. It flourishes best in chaos;
- As the levels in the organisation structure are irrelevant, primary power tool becomes control of information flow that is usurped by the internet and collegial networks;
- Primary form of revenues becomes intangible (learning, new ideas, new customers, R&D etc.) rather than tangible (money);
- Managers' power base is their relative level of knowledge and their role shifts from supervising subordinates to supporting colleagues. Instead they will supervise the space (intangible culture and intangible environment) in which knowledge is created;
- Management information systems reports competence utilisation, value added knowledge flows, customer images and staff attitudes and will be available for everyone on the central network;
- People are recognised publicly and rewarded for knowledge sharing as the culture encourages doing so;
- Investments in trust building become one of the management's priorities as top management recognises trust as the bandwidth of knowledge sharing;

- Hoarding of knowledge and information as a means of career advancement will be discouraged and the best knowledge workers are paid than their managers;
- The open-office is further encouraged as the value of the informal information network is recognised;
- The coffee machine is in the centre as it is regarded as a generator of creative encounters for knowledge creation.

Having some clarity on the appearance of the knowledge-based organisations, it is intended to find the approaches to create this environment in order to build the capabilities to face the changing environments.

Approaches to create the KM environment

Approaches to create this environment differ from organisation to organisation and reflect the unique characters of the organisation. Abell and Oxbrow (2001, p. 37) suggest that "KM is not a 'one size fits all' approach, it is a philosophy that needs interpretation within the organisation context". Hence organisations should take a cautious and targeted approach that will suit their own priorities and culture.

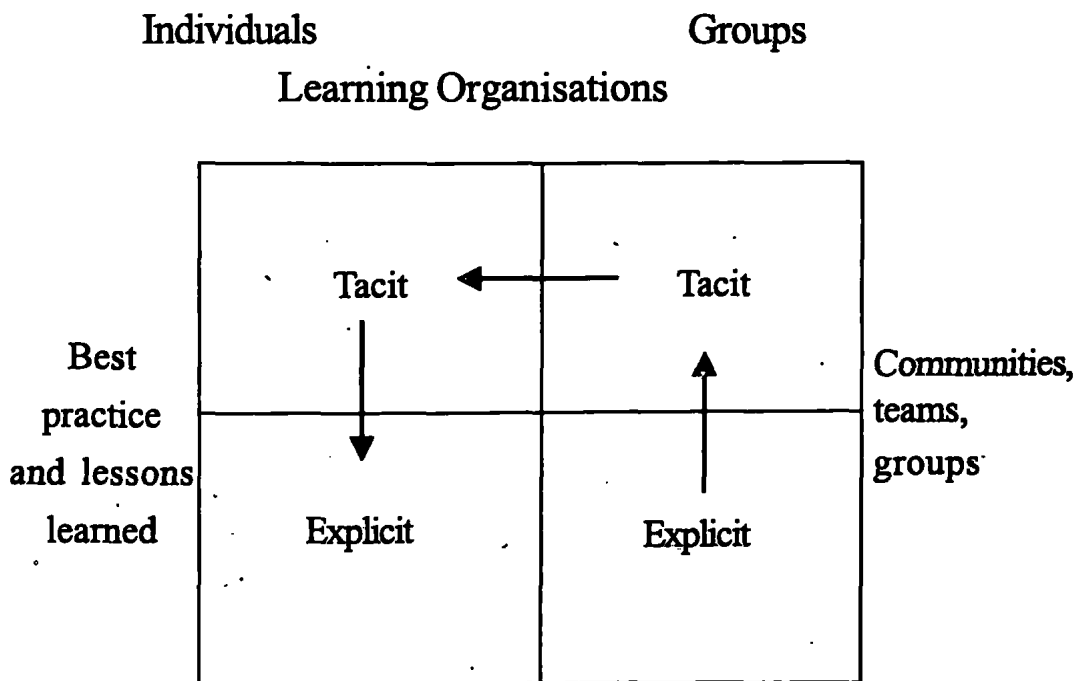
KM Strategy: Codification or Personalisation?

Hansen, Nohria & Tierney (1999) propose two diverse knowledge management strategies. First is the codification strategy : coding and storing knowledge in databases in order to access and reuse – "the person-to-document approach" and the second is the personalisation strategy: sharing knowledge that is hold by the person who develop it basically via person to person contact and using ICT to enable communicating each other. The selection of

approach depends on the organisation and its objectives as well as on the products and services of the organisation.

Framework for KM approaches and mechanisms to create the organizational capability by the interaction between tacit and explicit knowledge

Abell & Oxbrow (2001, pp. 45-48) plot the types of approaches on to the quadrants suggested by Nonaka and Takeuchi together with KM mechanisms that can be used for improving the interaction between two forms of knowledge: tacit and explicit (Figure 1).



Technology- intranet, virtual forums, groupware

Figure 1: Creating knowledge based organisations

(Source : Abell & Oxbrow 2001, p. 47)

Tacit to explicit – externalization

This transforms knowledge into a tangible form through documentation or discussion.

Converting tacit knowledge into explicit knowledge includes the following processes.

- Developing data bases to capture and share best practices
- Yellow and blue pages to locate skills and expertise
- Formal meetings and integration of knowledge about customers, competitors, markets and services or product development
- Intellectual assets management
- Mapping and signposting knowledge

Explicit to explicit – combination

Different forms of explicit knowledge such as documents or databases are combined at this stage. Technology being the key enabler facilitates the communication between individuals and leads the way to develop using following mechanisms.

- intranets
- portals
- communication platforms like virtual forums
- groupware

Explicit to tacit – internalization

Individuals internalise knowledge from documents, discussions or life long learning into their own body of knowledge. The following mechanism allows organisations to identify the assets that they own, which gives them potential for additional exploitation.

Intellectual property management

Tacit to tacit: socialization

Individuals directly test and share the knowledge while nurturing and building tacit knowledge. Together with internalisation, this approach focuses on

- facilitating internalisation between individuals
- building partnerships
- networks
- communities of practice.

Key benefits expected

Main benefit that any individual or an organisation receives is the ability of responding and building their own confidence to face the challenging environment that is internal as well as external. Several key benefits that any organisation would expect on individual as well as organisational level are

Individual level - KM activities provide employees with many opportunities to improve the skills and gain experience by working in team and project environments and sharing their own knowledge as well as gaining knowledge from other people.

Organisational level - Increasing the performance of the organisation through enhancing efficiency, productivity, quality, and innovation and revenue of the organisation by treating people's knowledge as a corporate asset.

Methodology

It was found that it is important to consider both the approaches: functionalist and interpretivist in developing simple and generalisable theory. Therefore, a combination of quantitative and qualitative research methodologies was seen as the most suitable

methodology for this study, as both can provide an insight when analysing the data attained. Online surveying and telephone interviewing were the chosen research methods as the participants were globally distributed.

Findings

Cognitive Map for the Role of KM in the changing environment in Central Banks

The findings were categorised into the main themes, and then the cognitive map techniques was chosen to give a broad and general view of the themes and sub-themes related to the role of the KM in the changing environments of central banks.

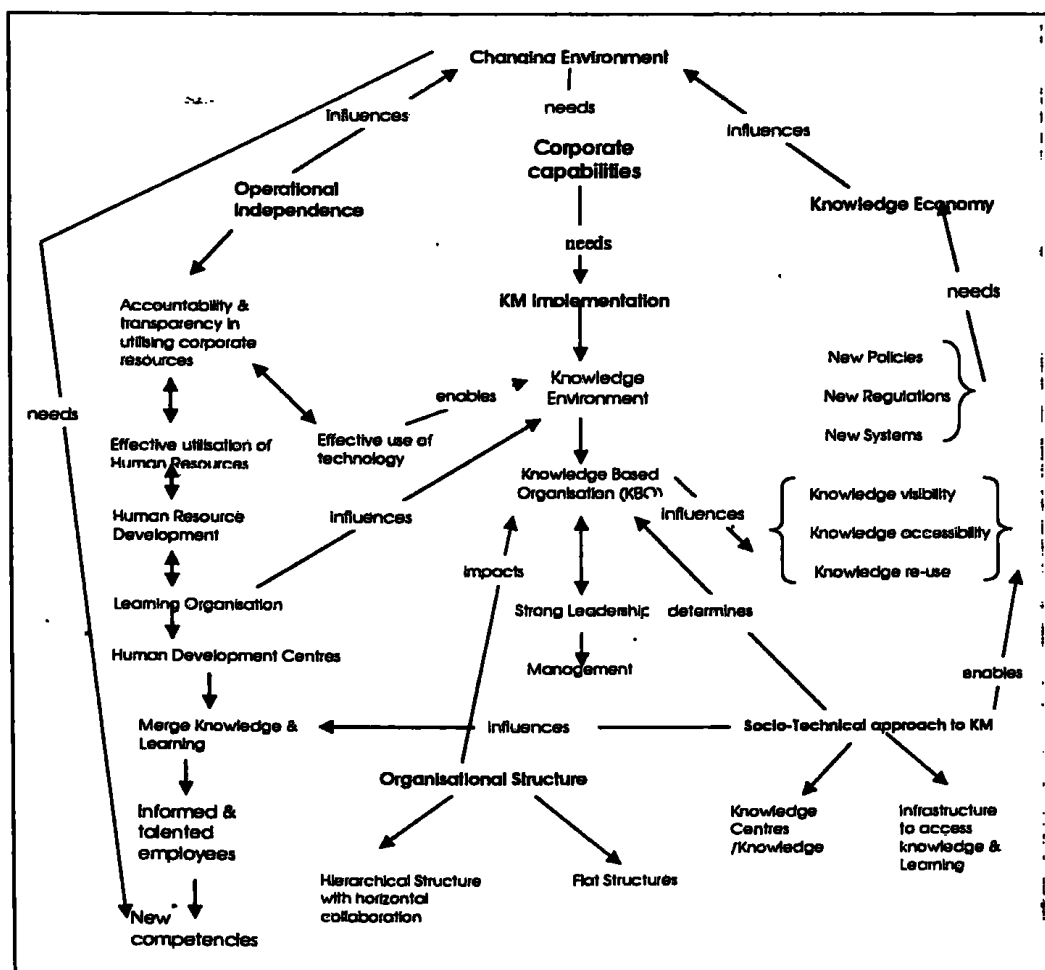


Figure 2: Cognitive Map representing concepts collected at the online survey and telephone interviews

Changing environment

Two main factors for the changing environment have been identified in the discussions. First is the operational independence granted for central banks while second is ever increasing knowledge economy. The first factor required central banks to make effective administration of corporate resources whereas the second made essential for having new regulations, policies, systems (Payment systems). Among the corporate resources, human resources was the most assessed resource, especially the concern on shifting demographics in developed countries. As a result, it tends to pay more attention to human resources as the organisation's success depends on its employees.

All interviewees pointed out how technology had made an impact on their lives as information and communication technologies (ICT) have produced more challenges but opportunities in actual fact. It was stressed how the IT platforms and software applications made the path to faster and cheaper communication. Knowledge economy together with globalisation made the financial industry more competitive and, as one interviewee mentioned, new banking products and new services are mushroomed and central banks have to be more vigilant on the financial stability. These changes require central banks to have a more skilled and talented workforce with new competencies like ability to learn, self initiation, collaboration, communication skills, IT literacy, management skills and strategic and business skills etc.

Organisational structure

For a number of those participated the online questionnaire, their central banks did not move to flatter structures though it was a

positive factor for a knowledge environment. It was interesting to find out from two interviewees that they still have hierarchical structures though they are pioneering central banks to practise KM, and as one of them described, she believes that hierarchical structures are better for big organisations due to the need for clear lines of reporting in the structures. Importantly both these central banks have more collaborative environments which supported by more horizontal collaboration and team based, cross functional project environment. Therefore, either hierarchical or flat structures could be supported by collaborative and team based setting with said tools.

Knowledge Based Organisation (KBO)

The general consensus among the respondents of the online survey was that central banks have identified knowledge as a key corporate resource. Theoretically, the knowledge is the primary resource of a central bank, and this was demonstrated as one interviewee stated KBO leverages knowledge wise performance where the employees are considered the value of the organisation. Another expressed the idea that central banks are knowledge based organisations due to the fact that they are the drivers of a country's economy, thus do not produce any tangible products. An interesting point of view was that the other central bank considers that KBO is an organisation where Knowledge Governance is practised in order to create an environment where knowledge is generated, like many other organisational assets, and governed and understood properly, and sharing knowledge across the organisation.

However, importantly, the concept of KM maturity levels, which are used for measuring the KM level of the organisation, is being

included as components of a road map that is used to reach the status of a KBO by one central bank. These levels being 1 to 4 are named initial, awareness, re-use & leverage and institutionalisation respectively and that particular central bank believes that they have not been reached level 4 but they are in somewhere in between level 3 and 4. This criterion assists organisations to follow a guideline to reach to the top most level where people will feel that KM is embedded in the culture of the organisation, employees' conduct and day to day processes, together with diffusing KM practices all over the organisation.

Building corporate capabilities using KM

Corporate capability is an integration of goals, structures, systems and culture KM could be utilised to develop these to not only manage the change but also to lead the change. Though the ultimate objective was to embed the practices into employees daily work processes, administering separate programme on KM, at least to bring an exposure and to get people understand what all is about, was indicated as important. The most distinctive feature was that this was not considered as just one person's attempt in these organisations. It was an effort of cross functional collaborative teams mainly Information Technology, Human Resources and Information and Documentation departments.

The first interviewee mentioned that they did a work environment survey to find out how the employees feel about their working environment in order to promote learning and innovation. Next, the second interviewee explained the process that they followed with a separate KM task force, with Knowledge Management Officers (KMO) from each department, specifically appointed

people who were willing to learn and face challenges as KMOs, and creating Knowledge Management Centre (KMC) that oversee the programme. The team has taken various initiatives, naturally with many obstacles to face mainly that the employees see it as a burden to embed KM in daily practices. KMOs act as change agents to assist employees with communication, constant awareness and to build the process to ensure that people share, and they retain and reuse knowledge in their daily routines. At the KMC, resources are provided both physically and online, for instance books and online databases that are very rich in their contents together with information services. The guidelines and governance for all these activities are provided by documenting processes like KM policies, content management policies, information dissemination policies and a claim centre. These tools and guidelines are provided in each and every department and KM Task force plays an advisory role in assisting the line departments, who are their stake holders to access the knowledge they have stored or to capture their knowledge to the organisational knowledge base. This acts as a platform for the knowledge required of the respective central bank which otherwise would not get accessed. In addition, there is a Human Resource Development Centre (HRD Centre) that provides learning. And later KM Centre has become a part of this as interviewee from that particular central bank "Last year we merged KM and learning because we saw these are two sides of the same coin, in other words there are many similarities". Their effort is to build architecture to offer KM and learning on just in time basis.

Establishing a Knowledge Theorists Group of three members representing Information Technology and Information Management Departments was the first stage of the KM

implementation in the other central bank. The team investigated what was KM and what was the importance of KM to the bank and together with a KM strategy, initiated a programme converting library to a knowledge centre with Documentation Management system and a record management system and at the moment deals with more KM projects. They have conducted several knowledge fairs in order to give the employees some exposure on KM and what they could achieve by practising it.

Acquiring knowledge

External partnerships with the academic community, or other financial institutions internationally and globally, and hiring practices, fellowship programmes where the people from academic community join in specific programmes like 'Leader in Economists in Residence' programme are some of the knowledge acquiring mechanisms used by the central banks. Moreover, the knowledge programme steering committee look into more collaborative technologies like 'cookies' and 'blogs' to inculcate capturing knowledge as much as possible. The effort is taken here to have collaborative approach in capturing knowledge. The interviewees believe that their central banks are fairly collaborative while they are looking for methods that make more collaborative environment. With the emphasis on research, continuous learning, and job rotation central banks foster an environment where knowledge is cherished.

Another interesting approach was the concept of "not just take but to contribute as well", where the employees have access to the information and knowledge that they need to proceed their jobs, while they are encouraged to lodge their new knowledge into the Knowledge-Hub (K-Hub). This interesting process where

capturing and sharing are considered equally, is a practice that the KM task force try to embed among its stakeholders. In order to achieve this they try to generate a culture that accentuates self directed learning together with knowledge sharing. Competencies are created in a way that the employees are expected to be learners as well as knowledge sharers at the same time. In addition to this approach, created knowledge especially in field work, project teams, working committees, cross functional groups are acquired by the K Task Force with their skills, and as required assistance is sought from consultants to acquire knowledge in new areas. K-Hub solely represents corporate knowledge of the particular central bank and as such knowledge is being "managed within one place apart from just explicit documents".

Sharing Knowledge

Employees tend to share knowledge among themselves to their advantage. One interviewee said "People don't just do it at the goodness of their heart. They do it because there is some value in doing it". For instance if either someone wants to get knowledge from somebody else or feels good about the fact that they know things, and also many more other inspirations for why employees share knowledge. Nevertheless, it is important to note the opinion that some people share too much, for instance, they focus on communicating everything at the expense of doing.

However, another interviewee bears the argument that Senior Management must impart knowledge sharing among employees. So that in her central bank, the Governor encourages sharing knowledge among all the levels of employees by convincing the importance of it. Another way of making awareness on this activity

among leaders is having senior management conference with the themes like horizontal collaboration. In addition, creation of a knowledge environment requires a mix of skills, behaviours and attitudes and they are called competencies such as knowledge sharing, collaboration, self initiation, ability to learn, humility, and ability to think and do etc. Therefore, she mentioned that every task is assessed against these competencies at their year end performance appraisal. She also added that individuals as well as "department connection programmes" are recognised and rewarded for knowledge sharing. As far as K-Task force concerned, they take an effort to make a clear understanding on knowledge sharing among the employees by making a knowledge sharer as distinguishable character and showing that how important this activity for them. Though K-Task force has found that there is a considerable improvement in this activity, according to the interviewee there are still "pockets of knowledge silos" in the relevant central bank. So it is obvious this task is very individual.

Respond to changing environment using KM

As the cognitive map shows, interviewees stated that a changing environment needs KM implementation to create the knowledge environment that carries knowledge and learning together to build the necessary skills, behaviours and attitudes – competencies of the employees to enable them to build their own capabilities as well as collective effort on building the corporate capabilities. Moreover, KM enables knowledge visibility, knowledge accessibility and re-use of it making organisations capable of building capabilities to build their future together.

Recommended KM approach

Being in infancy stage of KM implementation, many central banks are trying the best approach of KM implementation, and as such the respondents of the online questionnaire were neutral on the statement related to their KM approach either codification or personalisation.

Technology being identified as a key enabler, it was seen that KM implementation mostly rely on technology based architectures. Technology does a large part of this implementation. However, one of these central banks has a priority in their strategic plan to reduce IT run costs in order to maximise the funding for innovation. It is looked into more collaborative technologies like cookies and blogs those operate with social collaboration tools. In other terms they examine socio technical platform rather than a solid technological platform to KM. In other words technology that enables shared working, for instance online working, that includes cautious planning and skills required as some finds it as a barrier against many who get advantages. In addition KM competencies should be added to the performance appraisals like knowledge sharing, collaboration, self initiation, ability to learn, humility, and ability to think and do.

Success of a knowledge infrastructure depends on content management, as it gives a structure to the knowledge and information captured, that includes taxonomies, codes, templates, and assists smooth flow of knowledge and sharing. In terms of providing these skills Human Resources Departments have a crucial role to play. The need of inclusion of KM competencies in appraisal schemes, developing job descriptions appropriated to the

Knowledge environment, developing human resources with required skills, initiating staff rewards systems etc. indicate the challenge of aligning Human Resources to KM.

As discussed earlier, forming a multidisciplinary team representing various aspects of the central banks and its approach to KM would be the first task of KM implementation, and this team could carry planning, implementation and support. The teams may vary according to the size of the central bank, for instance, in a small central bank this can be added responsibility for the team members where as in larger one, it can be full time. These members should have desire to learn and face challenges and their key role is to understand and design the KM function with the understanding, where and how it should be implemented.

All central banks have skilled information professionals who could perform a bigger role in the codification of knowledge. Knowledge centres are seen as living symbols of KM initiative. This should include knowledge cafes, spaces facilitating discussions, electronically supported architecture to find the information resources and services together with physical resources. Another important part of a KM implementation is knowledge hub (K-Hub), or the central depository, where the collection and maintenance of all the information and strategic knowledge assets of the central bank takes place. Employees should be encouraged to contribute to the K-Hub in a culture that is induced with the policy of 'not to just take but to contribute as well', by giving an awareness of this contribution is for good of themselves as well as of the central bank they worked for.

Culture is crucial to tacit knowledge sharing, so that sharing should be encouraged in many forms. It should always promote people

to be self directed learners as well as knowledge sharers, by revolving people to be a competent and talented individuals with newly introduced competencies. Therefore, human development is considered essential, and as one interviewee revealed, it is pivotal to identify the relationship between learning and knowledge management. As she pointed out they are the two sides of the same coins and merger of these two are important. Learning is not just training; it is more than that, so that it has been produced rich knowledge and learning architecture which gives just-in-time, blended solution for seekers of information, training, learning, advice, sharing experience, knowledge or resources of knowledge and information.

The following KM structure with embedded Knowledge centre that combines learning and knowledge and K-Hub shows the collective layout of knowledge team or the K-task force that includes representatives or Knowledge Management Officers from all the departments, ICT infrastructure, knowledge network and the organisation itself. The model was built upon the base structure produced by Abell & Oxbrow (2001, p. 92)

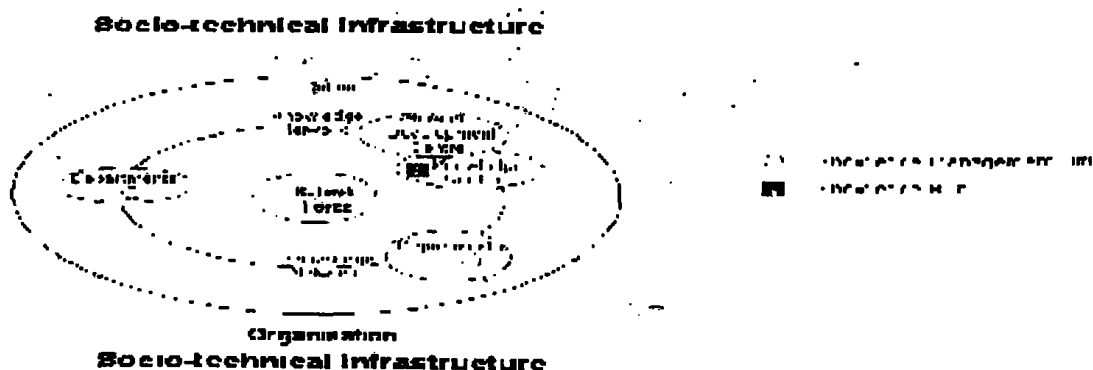


Figure 27: KM Structure with Main Elements

Fig.3 -KM Structure embedding the Knowledge Centre

However, it is extremely cleared that collaboration and partnerships are the most required and knowledge environment that build the corporate capabilities should be created and nurtured by all employees, be senior management, heads of departments, all the other officers, with rest of the staff, even all the stakeholders who ever has a commitment to the organisation. It is the expedition of all, and not of a single person, that going to make the difference, to reach the institutionalisation level of road map to KM maturity.

(The content of this article represents the views of the author and does not necessarily reflect the views of the CBSL)

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Implications of intellectual property rights on access to knowledge in education and research

Harini Amarasuriya and Dileepa Witharana

Abstract

The emergence of the liberal economic model as the dominant governance model since the 1980s saw the spread of a strong intellectual property rights (IPR) regime across the world. Exclusive monopoly rights offered by the intellectual property rights regime to inventions in the field of literary work, art and science has generated a new set of global issues in accessing knowledge and has led the way to a movement on access to knowledge to counter the restrictions of inflexible IPR regimes. In comparison to this global trend, awareness of IPR implications on access to knowledge is weak in Sri Lanka. Based on a study conducted at the Open University of Sri Lanka this papers discusses how IPR law, copyrights and patents in particular, impacts education and research at all levels.

Introduction

Contemporary society is often described as knowledge or information based. Considering the distribution of wealth and power among nations or even individuals, it is clear that those who have access to knowledge and information occupy positions of privilege and power. Thus, the question of who owns or controls knowledge is a key factor in the distribution of power.

Intellectual Property Laws are one of the principal instruments regulating the ownership and dissemination of knowledge and information in contemporary society among other instruments such as regulation by exercising economic, political and social power and regulation through technical means. Intellectual Property Regulations (IPR) as it is manifested today is a fairly modern phenomenon. IPR gives exclusive rights to the creations of the mind. Copyrights and patents for example, protect the creator by limiting public access to information and goods. The idea is that the incentive provided by such protection through competition and profits is necessary to encourage innovation.

The growing move to control the dissemination and spread of knowledge has led to a counter movement known as the Access to Knowledge (A2K) movement which sees information and knowledge as necessary for socio-economic development and therefore not to be regarded merely as a profit making tool.

This paper will examine the IP regime in Sri Lanka and discuss its implications for accessing knowledge in regard to education and research. It will examine the policy framework in relation to education and research and discuss the ways in which existing IP

laws conform to or contradict national education and research policy goals. It will argue that the current status of education and research calls for an emphasis on improving access to information and building a solid knowledge base to meet the developmental needs of the country and that IP laws which stress protection rather than access to knowledge are out of step with the country's needs.

This paper is based on a study conducted by the Open University of Sri Lanka in 2009¹.

Background

Appreciation of creations is a phenomena that has existed throughout human history. The awarding of monopoly rights for a creation, however, is a comparatively recent trend with a history of a few centuries. While there were IPR laws active in a few industrially advanced countries intellectual contributions were considered public property in many parts of the world. It is in 1995, with the establishment of the World Trade Organization (WTO), that a comprehensive multilateral trade agreement on IPR was introduced. Trade Related Aspects of Intellectual Property Rights (TRIPS), one of the main agreements coming under WTO, expanded the traditional coverage of literary, scientific and artistic creations to incorporate areas such as computer software and even life forms. TRIPS establishes minimum standards for various IPR tools such as copyrights, trade marks,

¹ A study on "Intellectual Property Rights and Access to Knowledge Initiatives in Sri Lanka" was conducted as an inter-departmental research with the participation of the Departments of Legal Studies, Social Studies, Electrical and Computer Engineering and Mathematics and Philosophy of Engineering.

patents, industrial designs, geographical indications, trade secrets and integrated circuits. TRIPS is based on and supplements the Paris, Rome and Washington Conventions in their respective fields (Correa, 2000). TRIPS also requires WTO member countries to introduce local legislature or to revise existing legislature on IPR in line with minimum standards set by the global framework. By revising the law that existed so far, Sri Lanka introduced its new intellectual property rights law in 2003 through an Act of Parliament.

As mentioned earlier, IP flows from a belief that granting a monopoly for creators provides them with an incentive to be innovative. This belief is based on a particular theory of neo classical economics that states that all members of society share the same values of individualism and the pursuit of a greater share of material goals. Competition therefore is a natural state for human beings engaged in pursuing their self interested goals and satisfaction. This theory also states that human agents engage in rational economic behaviour and private property is a crucial component of this rational behaviour: unless individuals are guaranteed their rights to the profits and results of their efforts they would not be motivated to work hard and be innovative (Kabeer, 1995).

However, it can be argued that this world view which places individualism and self interest as the primary motivations behind human agency is but only one explanation of human agency. Collective goals or non material goals such as maintenance of relationships can be equally powerful motivations for human agency. Furthermore, when the pursuit of self interested goals consistently leaves less powerful groups of people or individuals worse off or not benefiting equally from such goals, then indeed

the whole rationality or even ethics of such values need to be questioned. Thus, the rationality of protecting information and knowledge in a situation where access to information and knowledge may be more urgent needs to be critically viewed.

While the study on which this paper is based considered both formal and traditional knowledge systems, for the purpose of this paper, only formal knowledge systems will be considered. The formal education system, that is the primary, secondary and tertiary education system in Sri Lanka is therefore considered as the main mechanism through which knowledge is disseminated and to a certain extent generated as well. The research environment in Sri Lanka within the education sector as well as publicly funded research agencies will also be considered.

We will now turn towards the policy environment and current state of the formal education and research sector in Sri Lanka.

The Education and research structure

There are several cycles in the education structure in Sri Lanka: primary cycle (grades 1-5), junior secondary cycle (6-9), senior secondary (10-13), tertiary education, and technical and vocational training. Legislation in 1997 made education compulsory up to Grade 9. Entry into technical and vocational training is possible after completing Grade 9 and at Grade 11 after completing the Ordinary Level national examination. To qualify for tertiary education and training students have to successfully complete the Advanced Level national examination at Grade 13 or to be graduated from a technical institution (ADB, 2007). While the establishment of private schools up to Grade 9 have been banned,

it is possible to establish private degree awarding institutions as long as they are not called universities.

The status of general research and development in Sri Lanka is considered weak even by the standards of many of the developing countries. This is surprising given its rich heritage of innovative and vibrant civilisations and also the establishment of a sophisticated research and development structure during the last century. There are 111 state institutions handling different aspects of research in various sectors. The number of state institutions comprehensively dedicated for research is 29 (Wickremasinghe, 2008).

Policy environment

There is no lack of policy initiatives in either the education and research sectors in Sri Lanka. The education policy environment is particularly strong. The compartmentalising of policies for the purpose of analysis and writing, however, may suggest a coherence and order that does not actually exist in reality.

- ◆ **Education Policy**

Sri Lanka is often highly regarded for its high achievements in the education sector. Successive governments invested in the public education system supporting the system with free text books, uniforms, school mid day meals and scholarship programmes. This has enabled Sri Lanka to maintain high literacy rates and near universal primary enrolment rates (this was achieved in the 1990s compared to the goal of 2015 set for most countries) more in line with educational achievements in countries with higher GDP rates.

Furthermore, Sri Lanka has also been able to achieve gender equality in the education system with slightly higher enrolment rates for women in secondary and tertiary education (ADB, 2007).

A system of education was in place from pre-colonial times and even the educational policies during the colonial period were generally regarded as progressive, in that education was recognised as necessary and important. As early as in 1906, regulations making schooling compulsory were put in place; for instance the Town Schools Ordinance of 1906 and Rural Schools Ordinance in 1907 were attempts to enforce compulsory schooling and to extend the provision of education (Little, 2003).

The fundamental policy guidelines that shape the education system in Sri Lanka is the Education Ordinance of 1939. While there have been several changes and reforms since then, changes have been made in the form of amendments to the existing Ordinance or as Ministry Circulars. Additionally, there were acts such as the Education Commission Act 9 of 1991 and the National Institute Act 28 of 1985 which basically established specific institutions to implement the broader educational goals of the country. Significant reforms were also undertaken in 1981 and 1997. School attendance was made compulsory for all those between the ages of 5 and 14 years through regulations in 1997 (Wettasinghe, 2006). Connectivity to the outside world is for the first time acknowledged as important in the 1997 reforms and thus IT education was brought into the school curriculum. The National Education Commission (NEC) reviewed the reforms and made further recommendations in 2003 in a policy statement titled *Envisioning Education for Human Development*. Additionally, the National Plan of Action for the Children of Sri Lanka 2004-2008 has also drawn from the

NEC recommendations. The Ministry of Education led Education Sector Development Framework and Programme (ESDFP) (2006-2010) supported by the World Bank also reflect the NEC policy framework. The ESDFP is organised under 4 themes:

1. Promoting equitable access to basic and secondary education
2. Improving the quality of education
3. Enhancing the economic efficiency and equity of resource allocation
4. Strengthening education governance and service delivery

The policy statement of the current President, the Mahinda Chinthana, devoted a section to national education in which improving facilities in all schools was emphasised with special mention of facilities for teaching languages, science and technology. The ten year development framework that has been developed based on the President's Manifesto, also emphasises technological skills for economic growth and national development, a focus on equity, quality, efficiency and effectiveness at all levels, to increase participation with a focus on improving facilities for disadvantaged and vulnerable groups and to increase relevance through curriculum reform, introduction of new courses as its goals in the section on education (Department of National Planning, 2006).

However, falling government revenues and increasing competition for resources especially as a result of rising defence expenditure has meant that government expenditure on education has been declining. The proportion of GDP invested in education has been below 3% between 2001 and 2007. What is also noteworthy is that the larger proportion of the education budget has been on recurrent expenditure. Thus, even when the education budget

has increased this has been mainly with regard to increases in the recurrent expenditure (Aturupane, 2009).

Higher Education in Sri Lanka has received comparatively lesser policy attention. Higher Education institutions in Sri Lanka are governed by the University Grants Commission which was established in 1978 under the Universities Act No 16 of 1978. There are 15 universities as well as a number of higher education institutions in Sri Lanka. One of the most evident problems with regard to tertiary education system in Sri Lanka is that of the number of students who are eligible for admission to the university, only about 16% actually get admitted (Department of Census and Statistics, 2001). The NEC formulated a National Policy for University Education in 1996 and a Presidential Task Force was appointed to develop an implementation plan. The main action points of the Presidential Task Force were in relation to expansion of university education, diversification on university courses and curricular reform, staff development and career guidance and resource mobilisation (Presidential Task Force Report, 1996). The lack of resources to improve the quality and relevance of courses is a serious constraint within the higher education system. However, all universities are expected to have corporate plans and to introduce programmes to improve quality and relevance of its courses.

Distance education and the use of new technology to make higher education more accessible particularly in the rural areas is gaining momentum. The ADB in particular has been interested in supporting the introduction of ICT in secondary schools and distance education for tertiary education (ADB, 2007). The Secondary Education Modernisation Programme (SEMP) initiated

in 1997 and now in its second phase established computer learning centres in 1000 secondary schools. The Distance Education Modernisation Project (DEMP) started in 2003 emphasises the promotion of open and distance learning and has a particular focus on strengthening the Open University of Sri Lanka and also supports 4 universities and 3 professional institutes to prepare material for on line learning (ibid).

- ◆ **Research Policy**

Sri Lanka, as an island located in a main shipping route and located just next to the great Indian civilisation, was always open to share knowledges, cultures and philosophies from other nations. This has contributed immensely to the advances of ancient Sri Lankan civilisations. However, this very fact of openness to outside world was a disadvantage when viewed from a national innovation point of view. Invasions by outsiders, mainly by South Indians and Europeans, resulted in collapses of evolving civilisations affecting the flow of knowledge from generation to generation. The most prominent was the era of colonisation of 350 years by Portuguese, Dutch and English from 1500 – 1948. The plantation economy that was established during the colonial times dramatically changed the entire social, economic and political landscape of the country handicapping the knowledge base available for innovation in the pre-colonial Sri Lanka. Plantation economy introduced plantation crops against food crops in mass scale and established infrastructure to strengthen the plantation economy. The colonial era can be considered to be continued even after independence in 1948 because the transition of power from English to an elite group of Sri Lankan didn't result in a breakaway from the colonial mindset. The advanced status of irrigation, agriculture, construction,

architecture and town planning the country has witnessed during pre-colonial times. , as a result, has ended up as mere memories of the island nation.

Policy environment of Research and Development (R&D) is provided by a range of sectoral policies such as agriculture, education, environment and natural resources, plantation industries, energy, fisheries and aquatic resources, highways, industry and investment promotion, lands, indigenous medicine, small and medium industries, etc. The overall policy for R&D, however, is provided by the Science and Technology (S&T) policy within the context of Sri Lanka. However, although, attempts to formulate a R&D policy have been undertaken since 1960, it has yet to be adopted. Currently policy directions for R&D come from the Mahinda Chinthanaya which has 13 policy goals in relation to R&D and the proposed National Science and Technology Policy which is currently awaiting Cabinet approval with 10 policy objectives. Both frameworks propose a range of measures to address the main challenges faced by the R&D sector at the moment, namely the lack of state support for R&D (low budget allocation for R&D), lack of highly trained professional in R&D organizations, underdevelopment of higher education and the science base in universities and lack of linkages between R&D institutions, industry and business enterprises (Amaradasa & De Silva, 2001). Proposed National Science and Technology Policy adds new areas such as the sustainable use of natural resources, prioritizing research in water, food, energy and environment and in new technologies (e.g. nanotechnology, biotechnology, information and communication technology, electronics, advanced materials and mechatronics), attention on natural hazards and national security issues into the policy framework. Interestingly

for the first time, the need to address IP issues is also mentioned in the proposed policy.

Current education and research status and practices

- ◆ **Education**

As mentioned previously, the disparities between schools with regard to the quality of education they offer and the facilities that are available to the students is a major challenge for the education system. Schools in Sri Lanka are divided into different categories based on the level of education and range of subjects they offer as 1AB, IC, Type 2 and Type 3. Additionally, the Ministry of Education also categorises schools according to the availability of facilities into five levels ranging from more congenial schools to very difficult schools. This categorisation is based on the availability of basic facilities, equipment, space, sanitation, qualified teachers and location in terms of distance to bus or railway routes. The disparities between the provinces is evident when considering the fact that more than 50% of the most congenial schools are in the Western Province whereas the North and East have only 16% more congenial schools and the North Central Province 17%. The percentage of schools under the category of very difficult is 38% in the North and East, 24% in the North Central Province and only 0.5% in the Western Province. What is even more alarming is that 24% of the more congenial schools do not have libraries and 21% do not have science laboratories. Among the very difficult schools around 80% do not have electricity (Ministry of Education, MDA Report, 2008). Of the schools offering A/L education only 26% offer science stream subjects as an option for students (Amarasuriya, 2009).

With regard to educational achievements and performance while Sri Lanka has impressive literacy rates, achievements in other areas are more worrying. Educational performances have been described as 'islands of excellence' with the best universities and schools producing students able to compete with the best in the world while average student performance is much lower than expected. For instance, primary school students have an average mastery of only 37% in the First Language (Sinhala or Tamil) and an abysmally low 10% achieving the targeted level of mastery in English. A mere 1% of children have achieved expected levels of mastery in English writing skills. Mastery in Mathematics is only 38% (World Bank, 2005). Considering that the foundation for education is laid at the primary level, these statistics are extremely worrying.

Educational achievements also reflect rural urban disparities where more than half the students have achieved mastery in Mathematics and First Language in Urban areas whereas in rural areas it is around 35%. 23% of urban children have achieved mastery in the English language whereas it is 7% of children in the rural sector. The differences are also regional with the Western province performing much better than the other regions with the North East, Central, Uva and North Central provinces lagging behind.

With regard to secondary education, examination performance at the O/L examination only about 37% have made the pass grade during the period 1998-2002. The pass rate at the Advanced Level examination during the same period has been between 50-55% (Aturupane, 2009).

The problem of unemployment among educated youth has often been blamed on the education system. While employers claim

that youth do not possess the characteristics or qualifications required in the labour market, it is also evident that opportunities for students to acquire these qualifications are not freely available either.

- ◆ **Research**

Expenditure on Research and Development (GERD) in 2004 was 0.2% according to the latest available statistics. This is in comparison to the 1% recommended for a developing country. The government contributed heavily in National Expenditure on Research and Development in 2004 with a percentage of 67.5% of the total. While foreign funding contributed 22.6% the private sector contribution was a mere 0.6%. National expenditure for R&D by discipline for the year 2004 was as follows. The highest percentage of money was spent for R&D in agricultural sciences (26.3%) and social sciences and humanities (26.3%). Expenditure for natural sciences, engineering and technology and medical sciences were 16.5%, 16.1% and 14.0%, respectively. Out of 4602, the distribution of R&D scientists in the sectors, "higher education", "state" and "private and NGOs" is 62.3%, 31.9% and 5.8%, respectively (NSF 2006). This is in comparison to the 2034 technicians work in "higher education" (30.6%), "state" (51.3%) and "private and NGO" (18.1%) sectors (NSF 2006).

Out of the the main reasons behind the weak status of R&D particularly highlighted are the brain drain of skilled professionals and researchers and the serious lack of funding allocated for R&D both in the state and the private sector. Irrespective of the impressive status of literacy and education the country has failed in the recent history to maintain a critical mass of high quality

researchers in the country. The single major reason behind mass scale brain drain and lack of funding allocation is the Sri Lankan conflict. The war has absorbed a significant portion of government money. The professional and the researchers from the Tamil community have left the country as a direct consequence of the war and Sinhala and Muslim professional and researchers have left as a result of lack of career opportunities which in turn is an indirect consequence of the war.

A survey conducted as a part of the OUSL study in 5 leading research institutions in state and non-state sectors, namely, Industrial Technology Institute (ITI) Sri Lanka, National Engineering Research and Development (NERD) Centre Sri Lanka, Hector Kobbekaduwa Agrarian Research and Training Institute (HK-ARTI), National Institute of Library and Information Sciences (NILIS) of University of Colombo and Social Scientists Association (SSA) provide interesting insights into the barriers and possible incentives for a vibrant R&D sector from the researchers point of view.

Apart from the SSA the four other institutions are state sector institutions and considered to represent in general the state sector mindset of innovation. Table 1 represents the perceptions of the researchers of the five institutions on incentives required to promote a vibrant R&D culture in the field of science and technology and barriers that would restrict such a culture in order of priority.

Table 1: Researchers perceptions on incentives and barriers

<ol style="list-style-type: none"> 1. Comfortable working environment for researchers (e.g. internet, library, laboratory) 2. Supporting administrative environment within institutions 3. Reasonably high payments for researchers and other relevant facilities such as transport, housing, etc 4. Recognition for individual contributions in R&D (e.g. integration with career advancement, awards social recognition, etc) 5. Hope for a prosperous peaceful country in the recent future 6. Strong patent protection for the inventor 	<ol style="list-style-type: none"> 1. Poor payments and working conditions for researchers 2. Inadequate allocation of funding for the R&D sector 3. Limited access to new science and technology innovations and inventions in the rest of the world 4. Lack of strong intellectual property rights protection for inventions such as patents
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(Note: Researchers were asked to prioritize the given answers in accordance with the importance allocated by each individual researcher. When conducting the overall analysis highest marks were given for the first choice and the lowest for the last choice, The total sum of marks for each question was used to draw conclusions)

Improvement in working conditions, supporting administrative environment, reasonably high payments for researchers and recognition of contributions in innovation by means other than IPR protection are all prioritised as useful strategies for promoting innovation at an individual level. Particularly important is to note

that the improvement in working conditions and a supportive administrative environment rates above higher salaries as incentives for a dynamic R&D culture. A sustainable solution for the Sri Lankan ethnic conflict could contribute significantly to national innovation through the reduction of defence expenditure and preparation of ground conditions to reduce brain drain and to attract those who have already left the country to come back. Finally, despite the rationale provided by the IPR regime that IPR protection would be the primary incentive for innovation, this was the least important factor identified by researchers.

Given the many challenges to the formal education and research system in Sri Lanka, it is certainly puzzling as to why establishing a strong IP protection regime becomes a priority over responding to all the other issues. For instance, basic infrastructure problems such as insufficient resources to support related costs such as electricity, maintenance of computer labs, cost of software etc have caused initiatives to promote Information and Communication Technology (ICT) to flounder. Students, teachers and researchers have complained of poor internet access (low speed as well as lack of access to computers and internet), language barriers, and restricted access to useful sites as problems that they face with regard to ICT. It is interesting to compare the costs of databases, also as an example, against the funds allocated for libraries.

Table 2: Cost of Databases

Database Vendor	Cost (Rs)
JSTOR (concessionary price for a few institutions)	0.2m
Science Direct	90m
Science Direct (for limited subject area)	15m – 30m
Blackwells Synergy	3.2m
Wilson Online	5.0m
Wiley Inter Science	6.2m
Hein Online	0.05m
EBSCO Host	13.8m

The cost of data bases which contain some of the latest research are inaccessible even to the universities due to high cost (See table 2). When we consider as an example the fact that the annual budget for the OUSL library was only Rs 1 million for 2009, the enormity of the challenges that face the education and research system in providing students, staff and researchers with up to date knowledge is clear. The OUSL study also revealed that many of the books that are recommended by the faculty to students are either not available locally and thus have to be bought at a high cost through special orders. Furthermore, resource constraints mean that the number of copies that can be obtained by the library is also limited. In such a situation, photocopying is an important less costly alternative for students and faculty both to access information. Provided below in Table 3 a sample cost comparison for five books with high demand.

Table 3: Comparison of photocopying and purchasing costs of recommended texts (sample) at OUSL.

Title	No. copies at library	Cost of Photocopying (Rs)	Local cost (Rs)	International Cost	Ratio of international cost to lowest photocopy cost**
Roman law and Common Law: A comparison, Alhusel Michael	1	212-531*	Unavailable	£29.99	26.2
Sociology, Anthony Giddens	3	547-1368*	Unavailable	£25.99	8.8
Marx, Weber, Durkheim: Formations of modern social thought, Morrison, Ken	3	229-573*	Unavailable	£22.99	18.6
Advanced Engineering Mathematics, Dass	3	679-1697*	1350.00	Indian Rs 305.00	1.1
Theory and Problems of Statistics, Spiegel	2	269-672*	747.50	\$93.00	39.7

(* based on the cheapest and most expensive rates for photocopying and ** at Rs. 185.2 for 1£, Rs. 114.8 for 1\$ and Rs 2.43 for 1 Indian Rupee on the 6th June 2009)

The Table shows how prohibitively expensive prices added with restrictions on photocopying seriously restrict access to some of the recommended texts that are available in limited numbers at the library. For example if they are to be bought, the widely used two books on law and mathematics would be 26.2 and 39.7 times higher than the cheapest photocopy cost: What is evident is that the Sri Lankan education and research system faces many challenges not the least being providing students, faculty and researchers access to up to date research and academic information. Developing the knowledge base therefore of the country or ensuring that education is relevant and of high quality becomes seriously difficult. This inevitably has implications for the quality of research the country is able to produce. While the

education policy has recognised the need to improve quality and relevance of education, including the need to improve facilities, and national research policy has recognised the need to link education and research Sri Lanka continues to be a knowledge *importing* country than a knowledge producing country. This also means therefore that the knowledge base of the country is heavily reliant on external sources to set the agenda and priorities. This is clearly not a healthy situation in terms of setting research priorities and making research relevant to the developmental needs of the country.

Intellectual Property Regime in Sri Lanka: scope, duration and economic rights (GoSL, 2003)

Intellectual Property Rights (IPR) tools such as copyrights, patents, industrial designs and trade secrets play an important role when it comes to education and research. The influence of IPR regime is felt from the national IPR legislature as well as the international IPR mechanisms (e.g. conventions, agreements and treaties) to which

Sri Lanka is a signatory. This paper will focus mainly on the Sri Lanka IPR law on copyrights and patents in discussing the conflict between country needs in education and research and the framework of IPR.

In compliance with the minimum standards requirements of the international IPR regime the Sri Lankan Copyright Law is now been expanded to cover the entire spectrum of literary, artistic and scientific domains. The conventional list of copyrightable items such as books, musical work, photography, paintings and dramatic

is now added with computer programmes, speeches and sermons, audiovisual works, works of architecture, works of applied art, illustrations, maps, plans, sketches, etc. The derivatives of the above work such as translations, adaptations, arrangements, collections of works and collections of mere data (databases) both in material and electronic form are also copyrightable. Ideas, concepts, principles, discoveries and mere data are, however, not allowed for copyrighting. The list of non-copyrightable material includes official documents and news.

The patents regime can be considered to be wider and allows patenting of any invention that is new, involves an inventive step and is industrially applicable. Patents cover new useful inventions (process, machine, manufacture, composition of matter), or any improvement of an existing invention. The list of non-patentable items include discoveries, scientific theories, mathematical methods, plants, animals, methods for treatment of humans or animal, technology of atomic weapons and inventions that impacts negatively on public order and morality.

In addition to the expanded coverage the strong protection provided as economic rights is also important for a discussion on implications of IPR on access to knowledge. The Sri Lankan copyrights regime provides economic rights to the owners of the above mentioned works for the lifetime of the author and 70 more years in addition to the conventional moral rights. The wide ranging exclusive economic rights include rights for reproduction, translation, adaptation, arrangement or other transformation, importation, public display, public performance, broadcasting and public distribution through sale, rental and export, etc. Patent law provides the owner of the patent exclusive rights to make, use, sell, offer for sale,

export and import the claimed invention for a period of 20 years from the application filing date.

Flexibilities and fair use

Flexibilities and spaces for fair use are incorporated in the international intellectual property rights regimes by considering the development requirements of the developing and the least developed countries that are challenged by the strong protection offered for intellectual innovation. The flexibilities and spaces for fair use are a result of hard fought campaigns by the developing country groups in multilateral forums of negotiations (Jawara & Kwa, 2003; Wallach & Woodall, 2004). Sri Lankan intellectual property rights law is an example of rather strange scenario of not using most of the important flexibilities and fair use measures offered in copyrights for developing countries. While some flexibility has been included with regard to patents, there is room for more flexibility given the developmental state of the country.. It is interesting to investigate why this disparity of non-using flexibilities for copyrights and using of them them for patents has happened. Literature on IPR and traditional seeds provides us with a comprehensive explanation (Gunawardena 2006, Rajepakse 2007). The draft Intellectual Property Rights Bill that was presented for public comments in 2002/03 did not, in fact, carry the incorporation of flexibilities and fair use measures for patents that appear in the current Act. It was the challenges presented by civil society groups at the Supreme Court from the angles of public health and patenting of living beings and arguments to the effect that the Bill could be considered unconstitutional on the above basis that led to the inclusion of these measures. The current status of the copyrights law, hence, poses the most significant

challenge for access to knowledge in education and research. The Sri Lankan copyrights legislature can be considered to be quite strong compared to the minimum requirements expected by the international copyrights instruments as well as the copyrights law of many of the countries in the Asia-Pacific region (with reference to CI 2006 and GoSL 2003). While the Sri Lankan copyrights law does not take full use of important flexibilities and fair use measures such as "teaching exception", "compulsory licensing" and "parallel imports" patent legislation on the other hand significantly restrict patenting of living beings and maintain flexibilities such as "compulsory licensing" and "parallel imports" thanks to the challenges posed by civil society groups as mentioned above.

IPR implications for accessing knowledge in regard to education and research

♦ Copyrights

The reality at the moment in Sri Lanka is that the full implementation of copyright law would both make a significant percentage of the Sri Lankan population liable for prosecution leading to either fines or imprisonment or both. The unaffordable costs of proprietary software, books and CDs has resulted in a situation where accessing knowledge in education and research is dependent comprehensively on 'pirated' software and CDs and books and other copyrighted literature obtained through illegal means or by violating the law with respect to photocopying. However, there is no reason to believe that a fully implemented monopoly right regime such as copyrights and patents would lower the cost of copyrighted material.

We discuss below the implications of the strong copyright protection offered by the Sri Lankan law on access to knowledge in education and research in relation to five specific flexibilities and fair use measures that affect education and research. It should be noted that these five measures do not cover the whole range of measures available. Flexibilities offered by the international IPR regime are defined, within the context of this paper, by the Berne Convention for the Protection of Literary and Artistic Works, 1986 and the revision of it in 1971, TRIPS Agreement and World Intellectual Property Office (WIPO) Copyright Treaty (WTC), 1996. The Berne Convention, however, provides guidelines for detailed flexibilities as the convention covering copyrights in a comprehensive manner.

a. Teaching exception: By considering the adverse implications of protection on access to knowledge, certain aspects of copyrights regimes are allowed to be violated for the purpose of teaching. The Berne Convention allows the use of full copies of copyrighted work in unrestricted numbers in reproduction, translation, adaptation, communication to public, etc. While countries such as Indonesia and Philippines make full use of that facility, Sri Lanka restricts the use of the teaching exception to reproduction and communication to the public (performance and display of work) and restricts reproduction to only "a short part" of the full work (by the way of illustration, in writing or sound or visual recording). Performance and display of work is limited to government and non-profit institutions and confined to classrooms. Photocopying of a whole work is restricted even if it is for teaching purposes and photocopying is not allowed at all for distance education. This happens in a context where the Berne Convention does not differentiate between distance education and face to face teaching.

As a mode of teaching that depends heavily on printed material to provide information to its student population the special prohibition of the use of photocopying for distance mode poses a severe restriction. Education institutions that serve direct or indirect commercial gains are also excluded from the teaching exception for photocopying (CI, 2006; GoSL, 2003).

b. Compulsory licensing: The Berne convention allows compulsory licensing for translations and for reproduction of copyrighted work under conditions of national importance. While countries such as Mongolia and Philippines make use of compulsory licensing for both translations and reproduction and Thailand for translations, Sri Lanka has neglected this facility. Compulsory licensing allows a country to translate or reproduce copyrighted work without the consent of the rights holder. The current Sri Lankan IPR law, in fact, had removed the facility offered in 1979 legislation to allow translation of copyrighted work into local languages if translations are not done by the owner within a ten year period. As a country that depends heavily on the limited amount of books available in Sinhala and Tamil languages for knowledge in education and research, not taking advantage from the compulsory licensing flexibility is a costly lapse (CI, 2006; GoSL, 2003).

c. Parallel imports: Parallel import is a flexibility offered to import copyrighted work through cheaper sources. National law can allow parallel imports by restricting the right of the author only to the first distribution of work. Even though many serving at higher education institutes and research institutes use this mode as a way to get quality, expensive and unavailable books for cheaper prices strict implementation of the law would close that avenue of

accessing knowledge. The current law only allows importation of a single copy of a work by a physical person for his/her own personal purposes (CI, 2006; GoSL, 2003).

d. Fixation of material form: Under the Berne Convention the national law of a country can limit the scope of copyrighted work to "material form". This allows countries to define narrowly the meaning of "material form" and leave digital material out of the copyright regime. In a context where access to software is a serious issues as a result of copyrights law one would wonder why the flexibilities offered under international mechanisms were not used (CI, 2006; GoSL, 2003).

e. Anti-circumvention: Certain (technical) measures can be used to undo technological protection provided for copyrighted work and the application of these measures is called "circumvention" within the context of the Sri Lankan law. Sri Lanka has introduced strong anti-circumvention measures irrespective of the fact that Sri Lanka is not a party to WCT. This restricts Sri Lankans using circumventive measures even when legitimate access is restricted by the copyright holder through technical means. This is now the general case in the world with many of the sites where money is charged or access is restricted. Implementation of the law would affect development in open source and means of providing access to disabled². India, Kazakhstan, Mongolia, Philippines and Thailand have not incorporated circumventive provisions in copyrights legislation (CI, 2006; GoSL, 2003).

² Presentation on "Formal Education" held by the Open University of Sri Lanka on the 30th April 2009 at the workshop to present findings from the study on Intellectual Property Protection and Access to Knowledge Initiatives in Sri Lanka

It is also important to discuss the status of library use, treatment offered for those with special needs (the visual and hearing impaired for example) and the use of software and internet.

Library use : The Sri Lankan copyright law doesn't allow libraries even if they are run by schools, education institutions or research institutions to reproduce a few copies for its own use. Only when the single permanent copy available is lost and when such a copy is not possible to be obtained under reasonable conditions, is another library allowed to supply a reproduced copy. When considering the restrictions of money allocated for libraries in educational institutes and the size of the student population catered to within Sri Lankan educational institutions this can be considered a restriction with strong negative implications from an access to knowledge perspective. Conditions of not allowing the reproduction of whole copies and restricting photocopy facilities offered by libraries only for "private research" (when it comes to research) are also concerns. If "private research" is interpreted as research conducted by an individual or a group of individuals for their own personal benefit, the logic of excluding research from the facility that is being conducted with objectives beyond personal benefit and for the benefit of the society, is not clear. Not reserving direct and indirect provisions to access copyrighted databases for education and research purposes is another area that affects libraries in a significant way draining vast amounts of money out from the small allocation of funds.

Prohibition of the right for photocopying for distance education impacts strongly the libraries located within distance education institutions where a large number of students have to compete for a limited number of original copies of recommended books that

are either expensive or not available for sale in Sri Lanka. With its unclear status of the possibility of belonging to the category of institution that serves any direct or indirect commercial gain the Library and the whole institution of the Open University of Sri Lanka is affected negatively from this restriction on photocopying. These restrictions becomes even more puzzling when the Sri Lankan education policy is taken into consideration where promotion of distance education is identified as one of the main policy guidelines.

People with special needs : No special reservations are made in the Sri Lankan copyright law for the education and research requirements of people with special needs. This too happens within a context where catering of marginalized is one of the main objectives of the current education policy³. Equal access to all including the disabled is one of the features of Sri Lankan education policy. This is supported by the disabilities policy which advocates for an inclusive approach to education. In order to implement these policies, providing educational materials in formats that students with disabilities can access would be key. However, disability has not been considered as an exception in local copyright law

Use of software and internet : While the government policy objectives on Information and Communication Technology is ambitious, the copyright law on computer software is extremely strict compared even with the law for other copyrighted material.

³ Presentation on "Formal Education" held by the Open University of Sri Lanka on the 30th April 2009 at the workshop to present findings from the study on Intellectual Property Protection and Access to Knowledge Initiatives in Sri Lanka

Computer software is excluded from the teaching exception. The strict interpretation of the Sri Lankan copyright law does not allow the use of internet at all for its users when it defines "reproduction" as making of one or more copies of a work or sound recording in any material form, including any permanent or temporary storage of a work or sound recording in electronic form and does not allow the user of reproduction of such copies⁴.

- ◆ Patents

Two important provisions from an access to knowledge perspective that is offered by the patent regime is the need of disclosure of details with respect to patent that is being applied and the exception given to exploit a patent for scientific research. This in theory seems a sufficient condition to ensure the access to knowledge aspects in research and also in education. However, the unavailability of patent disclosures as a public document and the restrictions imposed by Intellectual Property Offices in obtaining patent details seriously hinder the use of 'disclosed' details in enhancing access to knowledge particularly for research purposes. Exclusive rights provided for the owner of the patent for 20 years for a wide range of functions make the flexibility available for research purposes less meaningful. It also makes the researcher vulnerable of infringement of the rights of patent holder if the developed product is still considered to fall within the regime of rights of the owner of the patent (Boldrin & Levine, 2008). The use of flexibilities and fair use measures by the Sri Lankan patent law such as "parallel imports" and "compulsory licensing" measures in the face of anti-competitive practices, "national emergencies", "extreme urgencies" and for public non-commercial use seems to

⁴ *Ibid*

compensate to a certain extent adverse implications of international patent regime.

The Proposed National Science and Technology Policy, however, seems to miss the important role played by "access to knowledge" as a fundamental pre-requisite in generating capacity for innovation. Policy objective 8 of the policy targets of developing a culture of innovation and Intellectual Property and ensure the protection of IPR. IPR, according to the Policy, seems identified exclusively with patents and the fact that IPR also includes copyrights and trade secrets and copyrights and trade secrets, in return could restrict access to knowledge was not given enough thought. This lack of awareness on wide ranging implications of IPR has in fact created the situation where the National S&T Policy Objective 8 on IPR stays in conflict with several other Policy Objective of the same Policy document. Challenged in particular are the Policy Objectives to provide access and opportunities for all citizens in science education and research⁵

Conclusions

Challenges faced within the education and research sectors in Sri Lanka as discussed above are considerable. While Sri Lanka has achieved the target of providing equal access to education in the most fundamental meaning of the word, the huge disparities in the quality of education among the various establishments as well as problems in improving the overall quality and relevance of the

⁵ Presentation on "Innovation" held by the Open University of Sri Lanka on the 30th April 2009 at the workshop to present findings from the study on Intellectual Property Protection and Access to Knowledge Initiatives in Sri Lanka

education system to be able to produce the kind of educated citizens the country needs means that on many levels the Sri Lankan education system is in a serious state of crisis. Education and research are key areas for the development of a strong independent country that has the skilled population to make correct choices, select development priorities and choose what is appropriate for the country. The population needs to be not only technologically savvy but also possess the analytical and critical skills that are necessary to take the country forward. In order to do this there is a need for skilled personnel and appropriate facilities. Furthermore, research is needed to guide policy and ensure that it is applicable and relevant to country needs.

However, it is clear that Sri Lanka is woefully short of being able to produce the kind of educated personnel that is required or to conduct the research that is needed. That Sri Lanka has been able to achieve what she has is due to the investment made in education in the past and the dedication and skills of an older generation of educationists and researchers. Today we face a tremendous gap in leadership when it comes to these sectors. Tragically this is not because of anything in the capacity of its people but due to an education and research structure which restricts the information that is available and kind of knowledge that can be generated. Currently, Sri Lanka is highly dependant on external sources and as a result the ability and even space to consider which of the external inputs are most appropriate is limited. This has serious implications for production of knowledge in Sri Lanka.

While IPR is not primarily responsible for the state of education and research in the country, even from within an IPR regime, it

would have been logical to ensure that the IPR regime that is put in place does not place further restrictions to A2K. Given that the international regime allows for flexibilities based on the development state of the country, why local policy makers decided to go beyond even developed countries in restricting the flexibilities and fair use measures especially for education and research is to go against the very principles of the Sri Lankan education system.

Clearly the priority of the country should be to strengthen access to knowledge not to restrict it. The rationale behind the local IPR regime becomes even more incomprehensible when as discussed earlier it contradicts many policy goals and objectives in national education and research. It shows that policy makers have little regard beyond their own special area of expertise to ensure that national policies are consistent and supportive of each other.

What is of immense concern is the fact that the public at large and even academics and those directly affected remain unaware of the implications of IPR. IPR is considered as a protection of inventors and the argument that IPR promotes innovation has been accepted without question. However, the more serious implications and repercussions have not become part of public or even more specialised discussion. This is an area that needs attention and pressure needs to be brought either to challenge or change existing laws to suit the needs and conditions of the country.

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Paper Presentations

Session - 02

*Advances in ICTs and
web Applications in LIS*

Access to Library Services through ICT tools: A Survey

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Abstract

This is the component of the research work carried out at Kuvempu University, India. Here investigation has been made for 418 R&D library users in the field of science and technology on the access to library services in technological changing environment. The study results that, majority of the R&D library users use the library services daily that too, literature search is predominately used through automated, LAN and web based library services. The survey also points out that, because of the essence of IT applications, the library users are enabled the rapid communication in utilizing the wide and varied aroma library services.

Keyword: Library Services, Information Technology and Survey

1. Introduction

The rapid change in information and communication technology (ICT) has made a profound impact in the Library and Information Centers all over world especially on the methods of information acquisition, processing, storing and dissemination. On the other hand, the advent of Internet has brought a revolutionary change in the scenario of library and information services. The information seeking behavior of the research library users has changed quite a lot. The explosion of information technology has created challenges and opportunities for information professionals to render library services in the changing technological environment. It's a real challenge for them to balance between the printed as well as digital library services. The present phase with all the rapid developments in digital computers, telecommunications technologies and the networking power of Internet, Intranet and Extranets seems to be a transition period of rapid change a paradigm shift in the library and information center where information professionals as well as users need to re-define themselves to accustom with the fast changing technological environment. There are advancements everyday in the field of information technology resulting into the emergence of e-commerce, e-business, e-banking, e-governance, digital library, virtual library and the general shift towards digital economy. The scenario has shifted out to a world of distributed model than the controlled set up used before. This calls for re-defining and re-orienting many of the activities related to information work and services. What has emerged in the post 1990s is the convergence of the technologies to digitized, stored, access data and innovative way of designing information systems and services. Various types of library services such as services through automated, services

through LAN-based, services through Web-based, services through Web-portal-based can be provided to the users in the digital library environment.

2. Characteristics of library users

- ♦ Library users under study comprises of both male and female
- ♦ The respondents are scientists, teaching faculty, trainee and others;
- ♦ Most of the users are having either post graduation or PhD degree;
- ♦ Most of the users were in the age group of 20 to 55 years

3. Objectives of the study

- ♦ To locate the place and frequency in the use of IT application with respect to gathering the needful information.
- ♦ To find out the reasons why do the users need IT-based library services?
- ♦ To know which type of IT-based infrastructure facility are advised to improve in library
- ♦ To notice the different medias they use to avail library services
- ♦ To discover the varied barriers they face while accessing library services in the environment of information technology.
- ♦ To study the approach/ attitude of library users towards the digital information content

4. Methodology, scope & limitation of the study

The research was carried out at R & D Libraries in the field of Science and Technology that are spread over the Karnataka State of India. The reason of choosing Karnataka under study is because of having more IT application at early stages compared to other states. Therefore it was logical to conduct a study by select research library users in Karnataka to know the status and perception of IT application or use by the library users. In order to do so, a set of questionnaire was designed for library users of R & D Libraries. There were 650 questionnaires distributed personally to the users of 13 research libraries. The number of duly received respondent questionnaire was 418 (i.e. 64.30%). The responses were being analyzed from different angles to know their perception and use of information technology in order to access their required information. Even the statistical tools are used to study the concentration and dispersion of various users opinion on the use of it in libraries

The study is limited to one state in India i.e. Karnataka due to the lack of time. But, the users were spread over all the reputed R & D Libraries in Karnataka in order to avoid the regional biasness.

The statistical tools are used to study the concentration and dispersion of various users opinion on the use of it in libraries. The Co-efficient of Variation is used to study homogeneity and heterogeneity of a group or between two groups. For comparing two groups, the lesser the co-efficient of variation, the group is more consistent (or homogenous) and more the Co-efficient of Variation the group is more variable or less consistent. The standard deviation and coefficient of variation are used to study

the dispersion of observations. These measures are defined for the frequency distribution as follows.

Standard deviation

The standard deviation for the frequency distribution is given by

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^n f_i (X_i - \bar{X})^2}$$

Where $N = \sum_{i=1}^n f_i =$ Total no. of frequencies, $\bar{X} =$ Arithmetic mean of X_i

Co-efficient of variation

The relative measure of Standard Deviation (SD) is the Co-efficient of Variation (CV). Co-efficient of Variation is defines as the Standard Deviation as the percentage of mean

$$C.V. (X) = \frac{\sigma}{\bar{X}} \times 100$$

Where $\sigma =$ Standard Deviation

$\bar{X} =$ Arithmetic Mean

Chi-square test

The Chi-square test for independence is applied to study the association between two attributes and is given by

$$\chi^2 = \frac{\sum_{i=1}^n (O_i - E_i)^2}{E_i}$$

Where

$O_i =$ i the observed frequency

$E_i =$ i the expected frequency

The equation follows the Chi-square distribution (n-1) d.f. and (r-1) (s-1) d.f. for r X s contingency table.

5. Analyses and interpretation

5.1 Use of IT applications

In order to identify the place of accessing Information Technology applications, respondents were requested to provide details on it, and responses are reported in the Table 1

Table 1: Place to Use the Modern IT Applications

Place	N=418	%	Mean	SD*	CV**
Library	410	98.08	1.01	0.14	13.86
Commercial centre	317	75.83	1.17	0.22	18.80
Dept. Lab	162	38.75	1.61	0.49	30.43
Home	94	22.48	1.78	0.42	23.59
Institution IT Lab	79	18.89	1.81	0.4	22.09
Friend's Home	40	09.56	1.9	0.3	15.78

* SD = Standard Deviation; **CV = Coefficient of Variation

As per the co-efficient of variation, majority of library users use library to access modern Information Technology application to fulfill their needs. As per the mean the variable library is highly rated for use of modern Information Technology applications when compared to other variables for place to use information technology. It is pleasure to note from the Table 1 that, a large group of respondents have made use of the facility of accessing the Information Technology in their library itself (410=98.08%). The other respondents also remarked that, they access Information Technology facility at commercial centres (317=75.83%). A few respondents access Information Technology at department laboratories (162=38.75%), institution labs (79=18.89%), homes (94=22.48%) and also at their friend's homes (40=9.56%)

With this table it is clear that, nowadays library are transforming not only as a centre for accessing the print books and journals, but also motivating the library users to use ICT tools.

5.2 IT Application based library services

In order to find the use of Information Technology application based library services, respondents were asked on this, responses are tabulated in the table 2

Table 2: Use of IT Based Library Services

Use	Number N=418	Percentage
Yes	411	98.32
No	7	01.67

As per the Table 2, out of 418 respondents, 411 (98.32%) respondents were utilizing the Information Technology based library services and remaining respondents (7=1.67%) said 'no' for the use Information Technology based library services provided by their libraries. This clearly shows that almost all the respondents, under the study are in favour of using electronic services in their libraries.

Here, most of the library users are using IT based library services to save their valuable time or to get the pinpointed information to full fill their research needs.

5.3 Reason for the use of IT application based library services

In order to find the purpose of using the Information Technology based library services, respondent were requested on this.

Table 3: Reason for the Use of IT based Library Services*

Reason	N=411	%	Rank	Mean
Study	258	62.77	2	1.38
Training	58	14.11	8	1.86
To Write paper	137	33.33	5	1.67
Research	305	74.20	1	1.27
Office work	179	43.55	4	1.57
Entertainment	82	19.95	6	1.8
Teaching	59	14.35	7	1.86
Communication	215	52.31	3	1.49

* Multiple-choice questions

As per the mean the variables research, study and communication are highly rated when compared to other reasons to use IT based library services. As per the tabulated responses in the Table 3, out of 411 respondents, a large group of respondents remarked the use of Information Technology based service for research purposes (305=74.20%). Many users have also remarked for study (258), communication (215), office work (179) to write research papers (137), entertainment (82), teaching (59) and also for training purposes (58).

As survey has been made in the R&D libraries, naturally the library users will use the library for research purpose only and they will use the library to communicate the result of research with their professional friends or colleagues.

5.4 Frequency of use of IT application based library services

The statistical data in the Table 4 witnesses that; nearly half of respondents are using Information Technology based on library

services daily (219=52.39%) for various purposes. It can be also seen that 74 (17.70%) respondents are using IT based services for once in a week. Only a few respondents using IT based library services for twice a week (49=11.72%) followed by bi-monthly (20=4.78%), monthly (19=4.54%) and occasionally (37=8.85%).

Table 4. Frequency of Use of IT based Library Services

Frequency	Number, N=118	Percentage
Daily	219	52.39
Twice a week	49	11.72
Once a week	74	17.70
Bi-monthly	20	4.78
Monthly	19	4.54
Occasionally	37	8.85

It is pleasure to note that, majority of the library users used IT based library services to full fill their research thrust.

5.5 Facilities accessed in library

Information Technology application facilities is an umbrella for accessing many IT based library sources/services for users. Respondents are asked to describe various IT facilities accessed by them. Responses are reflected in the Table 5

As per the mean (Table 5) the variable like computer, photocopy machine, Internet, Online database and library software are highly rated variables when compared to other variables (i.e. Most of the library users access to the facilities like Computer, photocopy machine, Internet, online database and library software). Remaining variables are used as decreasing order of the rank in the Table 5

Table 5: Facilities Accessed in Library*

Facility	N=418	%	Mean	Rank
Computer	375	89.71	1.14	1
Photocopy Machine	332	79.42	1.25	2
Internet	319	76.31	1.28	3
Online database	304	72.72	1.29	4
Library software	273	65.31	1.33	5
E-mail	290	69.37	1.35	6
Printer	251	60.04	1.44	7
Telephone	245	58.61	1.45	8
Library Home Page	204	48.80	1.51	9
LAN	151	36.12	1.5	10
Intercom	168	40.19	1.64	11
Scanner	109	26.07	1.73	12
Fax	110	26.31	1.74	13
Projector	106	25.35	1.75	14
CD-NET	107	25.59	1.75	15
VCD	83	19.85	1.81	16
Video	61	14.59	1.85	17
Microfilm reader	72	17.22	1.87	18
LCD	55	13.15	1.87	19
VCR	44	10.52	1.89	21
Microfiche reader cum printer	44	10.52	1.89	21
Microfiche reader	45	10.76	1.89	20
Microfilm reader cum printer	28	6.69	1.94	22

When the responses were further analyzed to test the dependency of attributes through cross tables, the results of chi-square test indicated that, the association is statistically significant at the .05 level in the respect of the following attributes. The association between "scientist" verses telephone, computer, photocopy machine, microfilm reader, CD-NET, e-mail, inter-com, printer, scanner, projector, printer and access to LAN is statistically significant at .05 level

Computers and Internet are the vital part of the IT applications; naturally the library users use the facilities like computer and internet to utilize, when compared to other facilities.

5.6 Library services through automated library

Respondents were asked weather they are using various library services through automated library. Responses are presented in the Table 6 for necessary statistical analysis.

Table 6: Use of Library Services through Automated Library*

Library Services	N=418	Percentage
Literature search	282	67.46
Indexing	189	45.21
Document delivery	107	25.59
Reference	171	4.09
Referral	78	18.66
News clipping service	81	19.37
Bibliographic service	189	45.21
Translation service	42	10.04
Abstracting service	77	18.42
Selective dissemination of information	78	18.66
Interlibrary loan	81	19.37
Technical enquiry	129	30.86
Reprographic	66	15.78
Publication	98	23.44
Retrospective search	165	39.47
Management information services	83	19.85
New arrivals	117	27.99

*Multiple-choice questions

The Table 6 clearly points out that, large groups of respondents (282=67.46%) are using literature search service. More than 100 and less than 200 respondents have also opted/ utilized the services through automated library like, indexing and bibliographic service (189=45.21%), document delivery (107=25.59%), reference (171=4.09%), technical enquiry (129=30.86%), retrospective search (165=39.47%) and new arrivals (117=27.99%). A small group which is less than 100 respondents also utilizes the services

like, referral, news paper clipping services, translation services, abstracting services, SDI, Inter library loan, reprographic services, publication and management information services.

When the responses were further analyzed to test dependency of attributes through cross tables, the results of chi-square test indicated that, the association is statistically significant at .05 level in the respect of the following attributes. The association between the training course procured at library centre verses automated library services like literature search, document delivery, reference, referral, news clipping service, bibliographic services, abstracting services, SDI, Inter library loan, technical enquiry, reprographic, management information service and new arrivals are statistically significant at .05 level

Now day's information is becoming crucial and playing a dominant role in the research. Obviously the researcher will use the literature search to get the needful information in the automated library environment.

5.7 Use of the library services through LAN

With the advent of networking technology, it is not essential to visit the library to avail the library services. Now user can avail services from their department/ research laboratories through LAN of the library. Therefore, respondents were asked to provide opinion on this, the responses are reported in the Table 7 for more analysis. It is found from the Table 7 that, majority of respondents (117=27.99%) has remarked that, they are using literature search services through LAN. Out of 418 respondents only 100 or below 100 respondents are using different services through LAN of the library like; Indexing (49), document delivery (44), reference (94),

referral (56), news paper clipping services (45), bibliographic (64), translation (16), abstracting (32), SDI (31), Inter library loan (42), technical enquiry (59), reprographic (23), publication (40), retrospective search (67), MIS (29) and also new arrivals (56).

Table-7: Use of Library Services through LAN*

Library Services	N=418	Percentage
Literature search	117	27.99
Indexing	49	11.72
Document delivery	44	10.52
Reference	94	22.48
Referral	56	13.39
News clipping service	45	10.76
Bibliographic service	64	15.31
Translation service	16	3.82
Abstracting service	32	7.65
Selective dissemination of information	31	7.41
Interlibrary loan	42	10.04
Technical enquiry	59	14.11
Reprographic	23	5.50
Publication	40	9.56
Retrospective search	67	16.02
Management information services	29	6.93
New arrivals	56	13.39

*Multiple-choice questions

5.8 Use of web based library services

Now it is possible to provide/ access off-campus library services through World Wide Web. In India many research libraries are effectively using web technology to provide library services. Therefore, respondents were asked to describe various services, they are using as listed in questionnaire. The responses are tabulated in the Table 8 for further analysis.

As indicated in the Table 8, a few respondents (118=28.22%) use web based library services for literature search. It is striking to note that, less than 18.50% of the respondents are using web based library services for indexing, document delivery, reference, referral, news paper clipping service, bibliographic service, translation, abstracting, SDI, Inter library loan, technical enquiry, reprographic, publication, retrospective search, MIS and also for new arrivals.

Table 8: Use of Library Services through Home page/Web page *

Library Services	N=418	Percentage
Literature search	118	28.22
Indexing	39	9.33
Document delivery	34	8.13
Reference	69	16.50
Referral	52	12.44
News clipping service	67	16.02
Bibliographic service	42	10.04
Translation service	17	04.66
Abstracting service	32	07.65
Selective dissemination of information	25	05.98
Interlibrary loan	29	06.93
Technical enquiry	62	14.83
Reprographic	15	03.58
Publication	42	10.04
Retrospective search	75	17.94
Management information services	24	05.74
New arrivals	76	18.18

*Multiple-choice questions

The attitude of all users will be similar may it be in the automated or LAN or web environment to use the literature search predominantly as library services when compared to other library services.

5.9 Perception of IT applications by library users

Respondents were asked to check the perception, impact and barrier on Information Technology applications and digital documents, the respondents were asked to provide their opinion in various terms listed in questionnaire.

5.9.1 Impact of IT on library users

Information Technology has potential not only to improve the quality of existing library services but also to offer wide range of new services. Information Technology enables libraries to provide various benefits in terms of improved services. Naturally these varied benefits have several impacts on library users.

Table 9: Impact of IT on Library User

	5	4	3	2	1	Mean	Std. Dev.	CV
Caused the techno-stress for library user	43	91	112	136	36	2.92	1.13	38.69
I can interact with my own resources within and outside the library	73	192	133	19	1	3.76	0.8	21.27
Enabled to devote more time for other work	107	194	91	20	6	3.89	0.89	22.87
Improved the status of the library user	140	150	93	31	4	3.93	0.99	25.19
Upgraded the knowledge and skills of IT applications	141	160	79	31	7	3.95	0.99	25.06
Made it compulsory to learn and use modern IT application	166	147	37	64	4	3.97	1.09	27.45
Improved the work environment	122	211	71	13	1	4.05	0.78	19.25
To share information / research with distant colleagues	122	207	81	7	1	4.05	0.78	19.25
Improved the standardization of the library	142	183	77	16	0	4.08	0.82	20.09
Helps to access the information in defined format	139	192	78	6	3	4.09	0.82	20.04
Easy browse the electronic sources	133	213	65	6	1	4.13	0.73	17.67
Provision of accurate and current information	136	226	44	11	1	4.15	0.76	18.31
Improved the user satisfaction and attitude towards the library	141	212	54	10	0	4.16	0.73	17.54
Exploring wider area of information near to my area of topic	141	210	62	2	3	4.16	0.74	17.78
Enabled enormous savings in time and efforts	184	183	39	7	5	4.28	0.79	18.45
Enabled rapid communication	180	191	43	3	1	4.3	0.73	16.97
Fast access and delivery of information	193	189	27	7	2	4.32	0.85	19.67

5: Strongly agree 4: Agree 3: No idea 2: Disagree 1: Strongly disagrees Std Dev = Standard Deviation, CV= Coefficient of Variation

The respondents were asked to rate the impact of Information Technology on them on a five point scale from strongly agree to strongly disagree. The responses are statistically presented in the Table 9. The Table 9 points out that mean scores on the 17 aspects was 'high' ranging from "4.32 to 2.92" (agree to no idea). As per the mean, highly rated factors of impact on use of Information Technology are; fast access and delivery of information, enabled rapid communication, enabled enormous savings in time and effort, exploring wider area of information near to my area of topic and provision of accurate and current information. As per the Co-efficient of variation the variable 'enabled the rapid communication' is most significant when compared to other impact of IT on library user. The responses are further analyzed to test dependency of attributes through cross tables, results of chi-square test indicated that, association is statistically significant at the .05 level in the respect of following attributes.

The association between "training course procured at library centre verse impact on user like "made it compulsory to learn and use modern Information Technology applications, upgraded knowledge & skills of Information Technology applications, enabled to devote more time for other work, improved the status of library users, improved user satisfaction and attitude towards the library, improved work environment, helped to access information in defined format, helps to share information/ research with distant colleagues" are statistically significant at .05 level. The association between research scholar verse impact on user like "made it compulsory to learn and use Information Technology applications, upgraded knowledge of Information Technology applications, caused the techno-stress for library users, improved the status of library user, enabled rapid communication, provision of accurate

and current information, easy to browse electronic sources, "I can interact with my own resources without help of library staff" are statistically significant at .05 level.

Now days the world is becoming global village because of rapid communication in the IT environment, in this regard our survey result for the impact of IT on library is similar

5.9.2 Barriers to access IT applications based library services

To assess barriers faced by library users while using Information Technology based library services, respondents were asked to provide their opinion, and responses are listed in the Table 10 for further analysis.

Table 10: Barriers to Access IT based Library Services*

Barriers	N=418	%	Mean	Std. Dev.	CV
Non availability of consultation services	103	24.64	1.72	0.48	27.90
Lack of in-house maintenance programs	97	23.20	1.77	0.42	23.72
Lack of network facility	60	14.35	1.86	0.35	18.81
Frequent power cuts	59	14.11	1.86	0.35	18.81
In adequate trained staff in IT applications	102	24.40	1.76	0.43	24.43
Lack of user education programme	149	35.64	1.64	0.48	29.26

*Multiple choice questions, Std Dev = Standard Deviation, CV= Coefficient of Variation

As per the mean (Table 10), the main barriers faced while accessing Information Technology based services are frequent power cuts and lack of network facility. As per the co-efficient of variation, variable frequent power cuts and lack of network facility are significant barriers, when compared to other variables to access Information Technology based services. When responses are further analyzed to test dependency of attributes through cross tables, the results of chi-square test indicated that, the association

of statistically significant at the .05 level in respect to the following attributes. The associations between the user like "Scientist" verses barriers like "lack of in-house maintenance programs, lack of network facility, frequent power cuts and in adequate trained staff in Information Technology application" are statistically significant at .05 levels. The association between the user like "research scholar" verses barrier like "non availability of consultation services, lack of in-house maintenance programmes and frequent power cuts" are statistically significant at .05 levels.

In developing countries power fluctuation is the one of main barrier to perform the day-to-day routine work. Even our users are facing the same barrier in the use of IT based library services.

5.10 Approaches to digital information content

Table 11: Approach to Digital Information Content

Opinion	Number N=418	Percentage
Strongly Positive	168	40.19
Positive	215	51.43
Strongly Negative	1	0.23
Negative	5	1.19
No opinion	29	6.93

The statistical data in the Table 11 witness that, majority of respondents (215=51.43%) have positive approach towards digital information content followed by strongly positive (168=40.19%). A small group of respondents (5=1.19%) have remarked negative approach to digital information content followed by strongly negative (1=0.23%). Remaining respondents (29=6.93%) didn't give any opinion on their approach to digital information content.

Our majority of library users are positive approach towards digital information content, to gather the required information easily.

5.11 Findings of the study

1. Nowadays library are transforming not only as a centre for accessing the print books and journals, but also motivating the library users to use ICT tools.
2. Most of the library users are using IT based library services to save their valuable time or to get the pinpointed information to full fill their research needs.
3. As survey has been made in the R&D libraries, naturally the library users will use the library for research purpose only and they will use the library to communicate the result of research with their professional friends or colleagues.
4. It is pleasure to note that, majority of the library users used IT based library services to full fill their research thrust.
5. Computers and Internet are the vital part of the IT applications; naturally the library users use the facilities like computer and internet to utilize, when compared to other facilities.
6. Now day's information is becoming crucial and playing a dominant role in the research. Obviously the researcher will use the literature search to get the needful information in the automated library environment.
7. The attitude of all users will be similar may it be in the automated or LAN or web environment to use the literature search, predominantly as library services when compared to other library services.
8. Now days the world is becoming global village because of rapid communication in the IT environment, in this regard our survey result for the impact of IT on library is similar.

9. In developing countries power fluctuation is the one of main barrier to perform the day-to-day routine work. Even our users are facing the same barrier in the use of IT based library services,
10. Our majority of library users are positive approach towards digital information content, to gather the required information easily.

Summing Up

Information Technology has great potential for variety of applications in libraries as it contributes to improved quality, increased productivity, more efficient operations, better resources sharing and more effective services to users. Are the research library users availing or effectively using these services for their research activities? To know these questions, survey oriented study is conducted on use and perception of Information Technology applications by select research library users in Karnataka. The study reveals that literature search is the most popular services used by library users. They feel that use of Information Technology results in fast access and delivery of information and it also enabled the rapid communications.

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Distance education delivery through information technology applications: online learning is no more a dream with NODES

Lalith Liyanage

Abstract

This paper discusses the challenges and opportunities that arise when attempting to transform the tertiary and vocational education in Sri Lanka from traditional forms into modern form of delivery based on latest technology.

In all aspects of learning, technology can make a big impact. Technology, when used appropriately, can be very effective in terms of interactivity and content delivery among learners and between learners, between learners and teachers, especially in contrast to print-based traditional distance education. Learners, teachers and educational institutions all would gain and be empowered using new technology and most difficulties that arise due to constraints of scale, time and space can be effectively addressed using the same. Opportunities created in such a context for a

country like Sri Lanka are enormous. At the same time, there are several challenges to be addressed when moving into this new way of learning. A major national initiative in Sri Lanka, the National Online Distance Education Service (NODES) is discussed in this context.

Key words

Latest Technology, Content Delivery, Interactivity, opportunities, challenges

Introduction

According to the statistics of the University Grants Commission, every year there are about 100,000 G.C.E. (A/L) qualified students who fall into the category of "higher education opportunity less" due to the simple fact that conventional university system does not have the capacity to accommodate them. Similarly, there is a large number of professionals scattered around the country who seek higher education opportunities as well as continuing professional development for which no opportunities are found in their respective areas. In addition, most of the employers operating outside Western Province need to train their employees in various disciplines which also need to be addressed in the same domain. All these issues with regard to opportunities for continuing education have limitations or constraints in terms of accessibility to content.

Traditional solutions

From ancient "Disapamok" era to traditional "Gurugedara" to present day modern International-schools, education has been primarily "teacher centred".

Whether it is at teacher's home, or student's home or in a school, teaching and learning has taken place face-to-face between the teacher and students.

We sometimes call this system as "spoon feed" education because students are very much dependant on the teacher even though there are print-based materials available for students to read and learn. One of the key issues of this system is that the contact between teacher and students is a must without which learning does not occur. In many circumstances, when there are external factors disturbing this contact, we end up with no education taking place. The key factor for students to reach the teacher is to bridge the distance between two parties by whatever transport medium. Even with the best transport system in the world, still it would not happen if the teacher is not available due to many a reason. This context has led to thinking on how to break this "distance barrier" in education. Having education available "any time, any where" using "Distance Education (DE) mode" is a well-known approach around the world to address this issue. In our discussion, from now on we will focus on the DE mode.

In Sri Lanka, the Open University of Sri Lanka (OUSL) which comes under UGC has been the major distance education provider for the last two to three decades. While it has been successful in increasing opportunities to as many as 20,000 students a year, its inability to record acceptable pass-out rates points out the need to improve the delivery mechanisms adopted by this state institution together with other distance education institutions. Some weaknesses of the traditional approach of the OUSL system can be identified as

- (i) difficulty in being cost-effective due to resistance from students to increase fees,
- (ii) difficulty of the government to enhance financing,
- (iii) difficulty in providing learner support, especially to distant, rural areas,
- (iv) insufficient use of audio-video and electronic media,
- (v) difficulty of accommodating all students who demand university education through DE.

For a sustainable model all these are important constraints which need to be overcome. Other than the OUSL, to date eight conventional Universities in Sri Lanka have been offering external degree programmes. Also, a number of public and private post-secondary level institutions, professional associations and vocational and technical educational institutions have been offering degree, advanced diploma, diploma and certificate-level programmes, professional courses in "so called" DE mode but mainly in conventional (face-to-face) mode, which we will not consider in this paper because the focus is on the technologically enhanced or technologically supported delivery of content. Yet in all these efforts, the scalability, quality of content and delivery, lack of flexibility for learners and access had been the issues.

How technology can help distance education

Deploying appropriate technology is a promising option to overcome the above issues as conducting distance education effectively has been a challenge for a long-time. A key difference between the conventional approach and the DE mode is that the former is more "teacher centred" while the latter is more "learner

centred". It was evolved from the very primitive "*print*" based *first generation of distance education delivery* where students were given the educational content related to the program they enroll in as paper printouts. Students would study individually with a minimum support by the teacher and sit for exams. Even today, there are many ODL institutions using this method to teach DE mode students. Obviously, it has many drawbacks which eventually result in higher numbers of dropouts from the programs. A way out for this issue is by introducing technology to prepare, deliver and manage education in an effective way.

The introduction of *audio and television media in the second generation DE delivery* of education content with a little bit of one-way or both-way interactivity has found students gaining more productivity in terms of understanding the content. Audio visuals help students to see, feel and clarify things much better than it was with just print based text.

Moving a further step forward, *computer based learning* was introduced as the *third generation of distance education delivery*. Initially, by only using floppy diskettes and CD/DVDs which eventually stepped towards *web based learning or e-learning* as the *fourth generation of distance education delivery* with the invention of the Internet. Students found it very easy to manage their learning through the web with many interactive interfaces being introduced such as emails, online chats and forums, blogs, wikis, etc. Many renowned educational establishments in the world have adopted online education blended with their face to face classes in order to provide more flexibility for learners. This is called "blended learning" whereas some institutions have even introduced fully "online" educational programs where students do

not meet or visit the offering institution or teachers physically. To manage learning in terms of student enrollment and admission, online content and resources, student activities such as submission of assignments, quizzes, examinations, software systems called "Learner Management Systems (LMSs)" are utilized. It is the interface for students to access programs, interact with online tutors/mentors, fellow students, submit assignments, tutorials, course works, do online exams etc.

There are expensive proprietary licence based LMSs such as Black Board, Web.CT, Adventure etc as well as free open source based LMSs such as Moodle being used by various institutions in the world. It can create chats, forums, areas to submit online assignments, facilitate students to see their grades, allow teachers to check and evaluate actual, productive time of students being online, what type of activities students engage online etc. Moodle has been designed by accommodating 'open standards' so that any other interfaces would work in the course design aspects. Content created using any software tool with multi-media enrichment could be easily integrate with Moodle.

In online learning, the most advanced way to create the real physical learning environment as face to face classroom would be Video Conferencing technology. Although somewhat expensive, it would facilitate learners and teachers to see each other and communicate both ways even from far distances like thousands of miles.

Unlike in the face to face situation where academic counseling is restricted to the duration of physical contact, in online learning unlimited counseling from the tutors and mentors is possible. This is very useful especially in the case of backward students who

would have less communication with the teacher in the face to face mode. The experts' view on this is that those backward students would communicate much more than an active face to face to student.

The distance education world has moved further to the *fifth generation of distance education delivery* with the latest developments in communication technologies, i.e. mobile technologies. This we call *M-learning*. Mobile technologies have penetrated distance education with the "any time any where" concept where students access education content through wireless notebooks, palmtops, PDAs and smart phones bridging the distance, time, gender as well as poverty barriers for education.

Sri lankan initiatives & opportunities

In this light, the Distance Education Modernisation Project (DEMP) funded by the Asian Development Bank was launched by the government of Sri Lanka under the Ministry of Higher Education to modernize the distance education system in the country. Government's ruling manifesto, the "Mahinda Chinthanaya" (page 75) also emphasises the importance of having a modern distance education system in Sri Lanka.

The National Online Distance Education Service (NODES) established by DEMP is intended to provide online distance education services to the nation. NODES is the major outcome of the DEMP and the legacy organization to continue after the project is over.

NODES, on one side, will support online programme development at the levels of certificate, diploma, degrees and post-graduate degrees offered by universities and any other public or private

sector post secondary educational institutions. There are already a number of online programs running on the network from:

- University of Moratuwa,
- University of Peradeniya,
- University of Colombo,
- The Open University of Sri Lanka,
- Sri Lanka Institute for Development Administration (SLIDA),
- Post Graduate Institute of Medicine (PGIM),
- Sri Lanka Institute of Marketing (SLIM),
- Ladies College Department of Vocational Studies (LCDVS),
- IDM Computer Studies (Pvt) Ltd.,
- Open Arc School of Business & Technologies,
- Institution of Engineering Technology,
- Institute of Quantity Surveyors of Sri Lanka (IQSSL),
- Indination Computer Institute,
- Winstone School of Culinary Arts,
- Informatics Institute of Technology and
- Sri Lanka Library Association (SLLA).

By 2009, NODES expects to have about 40 programs running on the network. NODES operates a Content Development Unit (CDU) which has been staffed with instructional designers, multi-media animations and graphics experts and audio visual technicians. They are a part and parcel of the online interactive content development process. NODES plans to provide online content development services to any institution which does not have in-house capacity. NODES CDU will also assist any institution which develops online content in-house. Institution's Subject Matter

Experts (SMEs) will have to work with the CDU staff to get their online content developed.

NODES will facilitate the delivery of programmes, through its state-of-the-art high speed network running on IP/VPN technology. The Network Operating Centre (NOC) is located in Colombo. The network operates at 155 Mbps VPN connectivity which connects at the moment 22 NODES Access Centres (NACs) for students to access online programs. These centres are connected at 10 Mbps to the VPN and the NODES system has 45Mbps Internet connectivity. NACs are equipped with high end multi media computers averaging 24 at each of the locations, printers, photocopiers, scanners, wireless access points for wireless mobile tools to access Internet, video conferencing facilities to connect any of other NAC/NACs for real time conferencing, etc.

There are four NACs located in Colombo while rest of the eighteen NACs are located in Kandy (2), Anuradapura, Kurunegala, Ambalangoda, Matara, Ratnapura, Moneragala, Ampara, Katunayake, Galle, Hambantota, Kegalle, Polonnaruwa, Trincomalee, Badulla, Gampaha and Batticaloa. By 2009, NODES intends to establish 40 such NACs across the country. NACs will operate on all seven days, around 8-12 hours per day depending on the demand.

Considering the long term sustainability being a government entity, NODES has adopted "Moodle" open source Learner Management System (LMS) as it's LMS which gives variety of options to create interactivity. All programs are offered using this Moodle framework. Student or staff will be trained or guided on the LMS by CDU or NAC staff upon request.

DEMP provides financial assistance maximum up to six million rupees per program to any educational institution to develop their online course content which will eventually be hosted on NODES servers. These contents are accessed by students through NACs or with adequate Internet connectivity from home. DEMP also provides training on online content development and online tutoring and mentoring by International and local experts.

There is a scholarship scheme also available with DEMP for needy, disadvantaged students who want to follow online programmes through which breaking the digital divide and also the discrimination of the poor in education.

The preceding description implies a wide range of opportunities available in Sri Lanka for education seekers, education providers, technologists and content creators. The possibilities are endless. For example, an educational institution now need not be limited to Sri Lanka only; they can offer online DE mode programmes to students in other countries in the region as well or target the Sri Lankan labor force in the Middle-east.

Challenges

As stated above, the major reason for the modernization of the delivery of distance education in the country was the high non-completion rates being reported by the OUSL and other conventional universities which conduct external degree programs. One of the key success factors in distance education is the provision of sufficient and effective learner support through modern educational technologies in a way that is cost-effective and scalable. An effective system would serve not only advanced-level qualified

students who are unable to access tertiary education, but also the employed and unemployed population wishing to upgrade their skills for their current employment or for entry/reentry into the workforce. In providing such facilities through technology, most important factor to be considered is how the learners, teachers and other staff accept technology or how technology affects them. Technology will not necessarily be the solution for all the problems. Even if it tends to be the case in some situations, certain individuals might not be ready for it; some may not accept it at once. Some stakeholders may resist the change into the modern form from the traditional methods. These human factors need to be carefully considered and appropriate strategies need to be adopted to motivate the target groups. Training and providing access are important in this context. For institutions to adopt the modern DE approach, leadership and institutional commitment are essential. When planning for mass scale delivery of DE programs using technology, these issues have to be carefully considered. Otherwise, at the end of the day if the objectives are not achieved, the adoption of new technology in the first place is not justified. Another major challenge is the complexity and difficulty in development of good quality, interactive content for online DE delivery. This is an acute problem in Sri Lanka due to lack of trained/skilled staff, insufficient experience in developing online content, lack of motivation and commitment, lack of support from the top management, and most importantly difficulty in dedicating staff time amidst other commitments.

Conclusions

Sri Lankan DE system has been moving around the traditional way of delivering print-based content to students. Programmes of

the OUSL and external degree programmes of conventional universities have been experiencing high non-completion rates.

One promising solution for the above situation had been identified as the application of technology to create and deliver content. This can help to overcome time-space constraints of learners and provide a flexible and high quality learning experience. This also opens up immense opportunities to education providers and others.

However, there are several challenges to overcome when transforming into technology-based DE. Readiness of stakeholders and institutions is a must. Developing high quality interactive content is another challenge.

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A cost effective approach to redesign the library website for enhancing usability and accessibility

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Abstract

This paper describes the key tools and techniques that are widely used for usability testing of Websites together with authors' experience in using them for the on going Website redesign project at the Open University of Sri Lanka library. Besides, the current status of Sri Lanka, in terms of distribution of disability among the citizens and level of accessibility of university library websites, have been outlined to show how fast we should act to correct our careless mistakes to ensure the free and open access to information, we promised as the leading information service provider of the nation. Authors hope that the contents of this article will empower readers with tools and knowledge that can be used to perform successful Website redesign projects in their library environments.

Keywords: *Web accessibility tools, academic library Website, Website redesigning*

Introduction

Library is one of the key social institutions that have been vastly influenced by the development of the Internet and expansion of the information based society. At first, librarians started building up the Web counterparts for their physical libraries often as supplements but later these virtual libraries became the "LIBRARY" for learners who are, time or place separated, or prefer working in virtual environments. Today, virtual library has become a compulsory feature in higher education due to the abundance of electronic information resources and social demand for "any time, any place" library services. Hence, the library Website as the interface between the librarian and the patrons, has gained an innovative role.

A new passion for designing user-centred virtual library interface with enhanced accessibility and usability has emerged in the international library and information field to go on par with the global trend in establishing accessible Web design. Design of the Website is usually described in two key terms, usability and accessibility. "Usability" is making a Website as simple and fast to navigate as possible, and presenting the content in an easily readable format while "Accessibility" is making the content of a Website available to everyone. Cheryl Kirkpatrick's description on accessible Web designing - "Designing the Websites in a manner such that the information they contain is accessible regardless of a person's abilities or disabilities, software, or equipment" (Kirkpatrick, 2003) - provides simple but comprehensive view as it summarizes

all different situations when and where Web accessibility comes to play.

Simultaneously, various standards and guidelines have been put forward in national and international levels to facilitate barrier-free Web designing throughout the world. Web Content Accessibility Guidelines (WCAG) developed by World Wide Web Consortium (W3C) is a widely used and the most popular tool, which explains how to make Web-content, accessible to people with disabilities and defines target levels of accessibility. Another major step towards barrier-free Web design is adding the Section 508 to the Rehabilitation Act of 1973 of United State of America. Besides, countries such as Canada, Australia and Japan have initiated successful projects to formulate national guidelines to make sure that their countries' Websites are accessible to all. In addition, library professionals also had made several contributions in this aspect. International Federation of Library Associations'(IFLA) checklist - "Access to libraries for persons with disabilities" - authored by Irvall & Nielsen (2005), describes the Website accessibility in a separate section. Jasek's (2007) of Elsevier User Centered Design Group has put forwards a set of very valuable factors that are very helpful in designing an engaging and interesting library Website. Bibliographies published by University of Wisconsin library & NCSU libraries, which list various studies and publications of "library Website usability", are also very good sources to learn the accessible Web designing in library's perspective.

It is true that professional library literature is rich with scholarly publications that describe the library Website accessibility in various aspects. On the other hand, numerous library professionals such as Craven (2002), Kelly (2002), Schmetzke (2001), have declared

that a large proportion of library Web pages are not accessible. As Providenti (2004) accurately points out, in spite of Web accessibility being a well-established topic in library literature, reaching back to at least 1996, there seem to be a disconnect between recommendations for and implementation of accessible design.

Distribution of disability in Sri Lanka

Protection of the Rights of Persons with Disabilities Act No.28 of 1996 (Sri Lanka) has defined the disabled persons as "any person who, as a result of any deficiency in his physical or mental capabilities, whether congenital or not, is unable by himself to ensure for himself, wholly or partly, the necessities of life".

According to data collected by Census Department of Statistics Sri Lanka there were 274,711 people having disabilities by 2001. Males had a predominately higher rate of disability at approximately 58% versus 42% female.

Table 1 presents the statistics on the three major types of disabilities that limit one's ability of accessing the Web.

Table 1 - Distribution of types of disability in Sri Lanka by 2001

Type pf. disability	Male	Female	Total	Percentage
Disability in seeing	35,419	33,677	69,096	19.0%
Disability in hearing	40,584	32,759	73,343	20.2%
Disability in hands	31,070	17,061	48,131	13.2%

(Source: Census Department of Sri Lanka)

Undoubtedly, the situation might be far more critical by now due to the increasing road accidents and war activities during the last eight years. Sri Lankan government also has realized this growing

social issue in recent years. National Disability Policy 2003 is a good example for government's interest in ensuring equal rights for people with special needs. Unfortunately, despite its wide coverage of topics that address the accessibility of physical world, National Disability Policy 2003 has failed to discuss the issues regarding accessibility to cyberspace.

Hence, it is obvious that Web accessibility from the perspective of disability is yet to be received the attention at national level in Sri Lanka. Besides, there is hardly any evidence in the literature to indicate the individual or institutional interest towards accessible Web designing among Sri Lankan professional communities who are exclusively using Web channel to communicate with their clientele or for delivering information.

Level of accessibility of university library websites of Sri Lanka

As the leading information provider of the nation, academic library community of Sri Lanka has a bigger responsibility than any other sector, in exploring tools for dynamic information delivery. However, Web accessibility is a least discussed topic among the academic library community of Sri Lanka. Therefore, authors of this article decided to assess the accessibility of university library Websites to inform the librarians of the current status.

Fifteen government universities registered under the University Grant Commission (UGC) of Sri Lanka were taken as the sample.

A list of Web addresses of the library Websites (see Appendix 1) affiliated to the Universities was developed during the initial phase

of the study. Authors first visited each University homepage following the link provided by the UGC Website at www.ugc.ac.lk and checked whether it was providing a link to the library homepage of that particular University. If the institutional homepage did not list a link to the library homepage, then Web searches using "AltaVista" and "Google" search engines were carried out to locate the library site. The two different search engines were used to reduce the effect of routine weaknesses of search engines and to enhance the possibility of tracking the Web address if the relevant University is hosting a library site. The process was repeated a week later to minimize the possibility of temporary technical problems of the host server on non-availability of the Website at the time of first searching.

Please note that the link of the library site listed in the Sri Jayewardenepura University homepage was inactive during the period of the survey and authors could not locate active links either for Sri Jayewardenepura University library or Uva Wellassa University Library via Web searches conducted during the first two weeks of March 2009.

Accessibility evaluation test was conducted using "Wave" automatic accessibility evaluation tool during the third week of March 2009 for the 13 library sites located. Table 2 illustrates the results of the usability test.

Table 2 – Wave results of University library homepages of Sri Lanka

No. of library sites	Wave approved sites (Zero error)	No. of instances 1 - 5 errors	No. of instances more than 10 errors
13	0	7 (54%)	4 (31%)

It is true that results were very discouraging as there was not a single site that obtained the full clearance from "Wave". However, as shown in the table 2 the number of instances of accessibility errors existed on individual pages, showed that the situation is not that serious as it first appeared to be. Only around 31% of library sites had errors more than 10 instances while around 54% of the library homepages had less than 5 errors. Spindler (2002) declares that a site with 5 or less number of errors is quite simple to fix. Another positive factor is that majority of the tested homepages had just one or two types of errors, predominant by the absence of alternative text for auditory and visual content, which can be easily eliminated by adding alternative texts using <alt> tags. Adding meaningful and descriptive alternative texts for auditory and visual content not only makes the Website deaf and blind friendly but it also helps the indexing process of search engines thus Website could be more easily found by users as "spiders" that harvest words and terms from Websites can read <alt> tags though they cannot read information contained in images.

However, this kind of an accessibility assessment of the homepage can produce only a vague picture of the level of the accessibility of a Website. It is essential to run parallel assessments using different tools and manual checking of the homepage and at least second and third level pages to obtain precise and comprehensive results. Hence, a Website redesign project usually includes several tools and techniques throughout its multi-stepped process.

Website usability testing at OUSL library

Among the numerous methods and tools, OUSL library selected "think aloud protocol", "card sort protocol", "focus group discussion",

“paper prototyping”, “cognitive walkthrough” and “automatic evaluation tools” during the different stages of the redesign process, which included the following steps;

Step 1: measure the usability and accessibility of the existing library Website

Step 2: explore the user needs of the OUSL user population (student and staff)

Step 3: identify the terminology that can be understood by the users

Step 4: measure the usability and accessibility of the proposed Website (paper prototype)

Step 5: measure the usability and accessibility of the built up Website

The next section of this article describes the authors' experience in using above-mentioned different tools at the OUSL library Website redesign project, by way of sharing their knowledge with the fellow colleagues.

Think aloud protocol

Think-aloud protocol (TAP) is a very popular usability interface study technique that helps to evaluate the functionality, usability, strengths, and weaknesses of the site and to make recommendations for revisions. This tool is called “think aloud protocol” as it is expected from the participants to verbalize their thoughts as they complete a series of tasks.

OUSL library used this tool in three times during step 1, step 4 & step 5 of the redesign process.

Small numbers of participants were used for each step as recommended by usability Gurus like Jakob Nielsen and Thomas

Landauer. They agreed that the use of 3 to 5 subjects produces maximum cost-benefit ratio (Nielsen, 2000). Further, King (2003) points out that three tests with a smaller number of volunteers allow a faster turnaround and deeper-probing into the usability of the site, than if all 15 users are tested at once.

Participants

Six participants representing the cross section of the user population of OUSL attended the test sessions.

Procedure

First set of TAP sessions, based on the existing OUSL library site, were conducted during the month of March 2008. Pre-tested 12-task research instrument was created for the first step and then it was modified for the 4th and 5th steps according to the changing needs and nature of the Website/ paper prototype that is under evaluation.

Each session was monitored by a facilitator and an observer. Observer's worksheet, which included the set tasks together with the expected path/s to perform each task, was introduced to the selected observers, during an instruction session conducted to make them aware of the role of the observer.

At the commencement of all sessions, same introductory script was used to introduce the test to participants in order to make sure all of them got the same instructions. The tasks were written on 3"x5" cards and given to the participant one at a time in random order. As part of the instructions, all participants were encouraged to speak aloud throughout the test, verbalizing their thought processes and rationale behind their decisions.

The facilitator read the questions and interacted with the participant while the observer recorded the participant's actions, including:

- ◆ the path taken to find the answer;
- ◆ anything said while navigating the site; and
- ◆ any observations of the participant's behaviour

Average time allocated per a task was five minutes. If the participant was unable to complete within five minutes, then the participant was asked to move to the next question.

The level of success in completing the tasks were measured using the scale:

- ◆ Very successful = found the information quickly in the shortest possible path
- ◆ Successful = found the information fairly quickly, after 1-2 fault starts
- ◆ Moderately successful = found the information after several fault starts
- ◆ Not successful = did not find the desired information

The consent was taken from the participants to tape-record the session and use the "ScreenHunter" (www.screenhunter.org) software to track the path of the mouse clicks.

Focus group discussion

The focus group (FGD) is a relatively new arrival on the data collection scene. However, it is a key qualitative data collection technique that has been widely used to explore user needs during Websites redesign projects by professionals such as Tolliver, et al (2005), VandeCreek (2005) and Ward (2006).

Participants

Eight participants from the library staff participated for the first FGD session conducted on 3rd June 2008 and 11 members of the academic staff attended the second FGD session held on 11th June 2008.

Procedure

Pre-tested discussion Guides were e-mailed to the participants in advance. Another e-mail was sent on the day before the FGD session, asking them to go through the library Website before attending the session and reminding them the date, time and venue.

Both FGD sessions commenced with introductory speeches and refreshments. The facilitator conducted the sessions in a way to encourage participants to voice their ideas freely. The facilitator interfered only when it was necessary to remind the time, put the participants back on track or to encourage a participant to talk if he/she seemed to be just listening without contributing to the discussion actively. The sessions were tape-recorded and videoed with the consent of the participants.

Mailed questionnaire

Williamson (2000, p.217) declares that questionnaires have been used frequently in the information management/ librarianship field, especially to understand the needs of library users and to evaluate library services. He, further, states that they are particularly helpful in identifying user needs and satisfaction; attitudes and perceptions towards the existing system or newly developed system, in situations where there are large numbers of users at different sites.

OUSL is heavily using the postal medium to communicate with the students for academic and administrative purposes. Hence, redesign team decided that mailed questionnaire was the cheapest as well as the most reliable means to reach the widely scatted distance learner community of the University.

Participants

524 students representing four faculties of OUSL (10% of the students registered during the academic year 2006/2007) were selected for this questionnaire based user survey. The students of the 2006/2007 batch was selected because they have spent more than one year in the University by the time of the survey and expected to have sufficient experience to make useful contributions for this study.

Procedure

A questionnaire was designed incorporating some questions previously used by Blackman (2003) for his library user survey. Several new questions were also designed and added to cover the specific aims of this survey. A pilot study was undertaken before posting the questionnaire. Non-respondents were contacted over the phone and politely asked them to post the completed questionnaires if they were willing to participate in the survey. Questionnaires were posted during first two weeks of May 2008 and concluded the survey at the end of June 2008.

Card sort protocol

Card sort protocol is a widely used technique by Web-developers to identify user-preferred terms and to find out how they wish to group the items in the homepage of the Website in a manner that is easy and fast for a user to locate.

Use of library-jargon is one of the frequent negative feedbacks received during the think aloud session for the existing OUSL library site. Hence, the OUSL library decided to identify more appropriate terms to replace the terms that were found difficult to be understood by the users, and to find out suitable terms to indicate services and resources that are going to be introduced in the new site.

Participants

Ten participants were selected to represent the students of 4 the faculties and teaching staff of the OUSL.

Procedure

A 40-items card sort protocol tool was developed. Terms were written on the 5"x3" cards. A description (what is meant by the particular term) was given on the reverse side of the card.

Volunteered participants were contacted over the phone and decided a time that is convenient for them. Test was commenced on the 5th September and concluded on the 28th September 2008. The participants were provided with a large table where he/she can spread the cards for easy pick-up. Each of the participants was given a brief introduction on the nature of the test and explained what was expected from them. Participants were asked to set aside the cards that contain the terms, which are not clear to them.

While participant was grouping the cards and writing down the preferred terms on the participant's worksheet, the facilitator stayed in the vicinity of the participant in order to offer help when requested by the participant or if he/she seemed to be in trouble.

After the participant announced that he/she has completed the task the facilitator checked whether there were any left over cards

and if so explained the particular term/s and asked the participant whether the card/s can be fixed with any of the groups he/she has created. Then the facilitator went through the worksheet, which was given to provide alternative or preferred terms according to their choice. Each session was concluded with a brief, friendly discussion.

Paper prototyping

Dr. Jakob Nielsen is a strong proponent of paper prototypes being an extremely effective and an efficient testing practice before resources are committed to building a full Web-based interface. Prototypes allow designers the chance to quickly create early versions of a product that can be tested with users. It allows exploring different design templates beforehand. Another advantage is that constructing paper prototype needs just pen and paper and more importantly no technical skills are required. Hence, paper prototypes are easy for anyone to create (Ward, 2006).

First step of paper prototyping is to create a rough outline of the site based on the data collected during the preliminary studies. At OUSL library a brainstorming session was conducted with the participation of three members of the library staff and each member was asked to draw the homepage on a white paper to explore various design options before settling on a single approach. Incorporating all the ideas, the structure of the site was created using different coloured papers for different layers of the site. Coloured pens, sticking papers, screen prints etc have been used for highlighting or representing forms and navigation paths in the paper prototype. The book titled 'Paper prototyping: the past and easy way to design and refine user interfaces' was very helpful in

accomplishing this unfamiliar task of creating a workable paper prototype.

Then a set of "cognitive walkthrough" sessions and "think aloud protocol" sessions were conducted using the paper prototype of the proposed site to identify the accessibility and usability barriers of the design.

Cognitive walkthrough

Cognitive walkthrough is a review technique in which evaluators role play the part of the user and "walkthrough" the interface in an attempt to complete certain information seeking tasks. Walkthrough method proved to be very valuable for identifying ways to reduce clutter, reduce the number of links and make links more visible, and reduce the amount of text (McMullen, 2001).

The OUSL library conducted the 4 cognitive walkthrough sessions to refine the paper prototype design of the Website from 9th August to 12th August 2008. Two from the library staff and two from the academic staff were picked up for the test. Participants were asked to go through paper prototype and evaluate it according to Jakob Nielsen's "10 heuristics". An the list of heuristics is available at www.useit.com/papers/heuristic/severityrating.html.

Cognitive walkthrough sessions were conducted mostly as discussion sessions between the facilitator and the participant. Suggestions were recorded and necessary modifications were made simultaneously if possible, or else, soon after the session. Therefore, at least a 3 hours gap between each session was maintained in order to ensure sufficient time to do the necessary modifications before commencing the next session.

Think aloud protocol

Four participants who had participated in the first set of TAP sessions conducted during the step 1 and two new participants took part in this second set of TAP sessions. When performing TAP test using paper prototype, the facilitator played the role of the computer while participant's index finger played the role of the computer-mouse. For example, participants were asked to point out the keyword/s that they think as the accurate link to find the information requested by the task in hand and the facilitator produced the relevant page.

Automatic evaluation tools

Another important usability testing technique is the use of automatic evaluation tools. Fortunately, there is large number of free and open source products available in the Web. OUSL Library used 7 types of such tools to measure the usability and accessibility of the existing site and the new site that is under construction right now.

They are:

- ◆ Wave automatic Web accessibility evaluation tool (<http://wave.webaim.org/>) tests web pages for conformance to various accessibility guidelines including WCAG.
- ◆ "W3C Markup Validation Service" (<http://validator.w3.org/>) – checks the markup (HTML, XHTML) of Web documents
- ◆ W3C CSS Validation Service – <http://jigsaw.w3.org/css-validator> - checks Cascading Style Sheets (CSS) and (X)HTML documents with style sheets

- ◆ Contrast Checker (<http://q42.nl/demos/contrastcheck>), checks the suitability of background and foreground colours for colour-blind people and low vision people
- ◆ Image Analyser <http://juicystudio.com/services/image.php> tests width, height, alt, and longdesc attributes of images are examined for appropriate values and checks for accessibility issues.
- ◆ Juicy Studio readability test (<http://juicystudio.com/services/readability.php>) calculates readability index score for a text and helps to find out if a draft manuscript is at the right Grade Reading Level for the intended audience.
- ◆ AnyBrowser.com <http://www.anybrowser.com/> checks for different browser compatibility by viewing in various screen sizes and viewing with images are replaced by ALT text. Also available are HTML validation, link checking, search engine tools etc.

The OUSL library redesign team selected these tools because they are available freely online, easy to use and produces results in very simple and easy to understand formats.

However, there are many more popular as well as effective tools that you can select according to your specific needs and preferences. Links to several such tools are given below as examples.

Web accessibility evaluation tool:

- ♦ A-Checker - <http://webscripts.softpedia.com/script/Development-Scripts-js/AChecker-43826.html>
- ♦ Accessibility Check - <http://www.etre.com/tools/accessibilitycheck/>
- ♦ Accessibility Wizard - http://www.binaryblue.com.au/access_wizard/
- ♦ EvalAccess - <http://supt07.si.ehu.es/evalaccess2/index.html>
- ♦ Functional Accessibility Evaluator - <http://fae.cita.uiuc.edu/>

HTML Validators:

- ♦ HTML Validator for Firefox and Mozilla - <http://users.skynet.be/mgueury/mozilla/>
- ♦ WDG HTML Validator – <http://www.htmlhelp.com/tools/validator>

Colour Checkers:

- ♦ Color Laboratory - <http://colorlab.wickline.org/colorblind/colorlab/>
- ♦ ColorDoctor (version 2.1) - <http://www.fujitsu.com/global/accessibility/assistance/cd/>
- ♦ Colour Contrast Analyser - <http://juicystudio.com/services/colourcontrast.php>
- ♦ EveryEye - <http://www.everyeye.co.uk/>

CSS validators

- ♦ CSS Analyser - <http://juicystudio.com/services/csstest.php>

Readability testers:

- ♦ Readability index calculator - <http://www.standards-schmandards.com/exhibits/rix/index.php>
- ♦ Reading Effectiveness Tool - <http://www.eastendliteracy.on.ca/clearlanguageanddesign/readingeffectivenessstool/>

- ♦ Style and Diction - <http://www.gnu.org/software/diction/diction.html>

Browser compatibility checkers:

- ♦ Fangs: The Firefox Screen Reader Emulator - <http://www.standards-schmandards.com/index.php?show/fangs>
- ♦ Lynx viewer - <http://www.delorie.com/web/lynxview.html>

Image accessibility checkers

- ♦ Vischeck - <http://www.vischeck.com/>
- ♦ Flicker Rate Test for Gif Images - <http://tools.webaccessibile.org/test/check.aspx>

Concluding remarks

OUSL library learnt a lot from its usability testing process and collected invaluable information in terms of feedbacks, suggestions and comments towards designing a user centred library site. Besides, observing real users performing real tasks and short interviews afterwards during TAP sessions gave us a rare opportunity to closely interact with our students. It generated new insights such as relationship between poor Web designing Vs lack of information and computer literacy skills of users. Further, the capacity of usability testing on creating awareness among users, which was realized during the process, has brought new ideas for user-orientation programs. Focus group discussion sessions and user survey brought exciting suggestions to widen the resource-base and improve the visual appearance of the proposed site while card sort protocol generated a list of user-preferred terms.

Creating a Website, incorporating all these exciting suggestions and eliminating all the deficiencies is not an easy task. However, we as librarians of a nation that already consists of fairly large number of disable people; besides, at a risk of increasing the numbers significantly in the near future; cannot postpone making our Websites accessible in order to open the doors of cyberspace for disabled. Particularly, as we know that despite the recommendations of "Disability Policy 2003", that there are hardly any facilities for disabled to move freely in the physical environment. Fortunately, there are numerous low-cost tools and simple approaches to lift the barriers in the cyberspace. Hence, no need to wait for government funds; we can start fixing accessible problems of our Websites today itself.

Related links

Census Department of Statistics Sri Lanka

<http://www.statistics.gov.lk/>

University of Grants Commission

<http://www.ugc.ac.lk/index.php>

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Appendix 1

List of Website addresses of University libraries of Sri Lanka

University of Colombo Library

<http://www.lib.cmb.ac.lk/>

University of Peradeniya Library

<http://www.lib.pdn.ac.lk/>

University of Kelaniya Library

<http://www.kln.ac.lk/library/index.htm>

University of Moratuwa Library

<http://www.lib.mrt.ac.lk/>

University of Jaffna Library

<http://www.jfn.ac.lk/library.htm>

University of Ruhuna Library

<http://www.lib.ruh.ac.lk/>

Eastern University of Sri Lanka Library

<http://www.esn.ac.lk/Library/Index.htm>

South Eastern University of Sri Lanka Library

<http://www.seu.ac.lk/mission.htm>

Rajarata University Library

[http://www.rjt.ac.lk/main library/main Lib.html](http://www.rjt.ac.lk/main_library/main_Lib.html)

Sabaragamuwa University Library

<http://www.sab.ac.lk/library/Library.htm>

Wayaba University Library

<http://www.wyb.ac.lk/mkdr/lib/index.htm>

Open University Library.

<http://www.lib.ou.ac.lk/>

University of the Visual & Performing Arts Library

[http://www.vpa.ac.lk/Library/lib main.htm](http://www.vpa.ac.lk/Library/lib_main.htm)

Promotion of open access through self-archiving in Sri Lanka: lessons learned from E-LIS

J. J. G Arachchige

Abstract

This paper explores the main features of e-LIS; one of global level subject-based open access archive on Library and Information Sciences, and discusses the potential of obtaining E-LIS experiences to form a national level e-repository of scientific and scholarly resources in Sri Lanka.

It is found that only one national level open access e-repository is available in Sri Lanka. It is NSF e-repository and is still in the beginning stage. There are some attempts to approach open access concept; that several universities and other institutions tried to provide free access to resources by setting up subject gateways, linking to free resources in the internet, building Institutional repositories of institutional publications, and providing simultaneous access to e-journals purchased under consortia programmes. The success of these

attempts is not achievable because these attempts were based on personal interests rather than governing under a national programme with the help of authorities. It seems that a national level open access e-repository is essential to the country as the conventional paper mode archives are not able to satisfy the demand of teaching, learning and research community. Open access e-repository in Sri Lanka should be able to accommodate storing, diffusion and managing of knowledge output of the country. The promoting of self-archiving will be an effective mechanism to develop the national e-repository and experiences from global level e-repositories such as E-LIS can be used to form a framework for national level e-repository in Sri Lanka.

Keywords

E-repositories, Open-access archives, Self-archiving, Information sharing, E-archives, E-LIS

Introduction

The world now in the Information Age is practicing the knowledge-based economy where everything is determined on the availability of knowledge, know-how, and best practices. Every aspect of the development: Commercial, socio-cultural, educational, and political is associated with the access to information, and the sustainability of the economy depends on the level of Information behaviour of the nation. Science & Technology plays the major role in the knowledge-based economy and therefore, it requires national governments to work in collaboration with science and technology community and utilize their knowledge for the development.

Information is a vital factor to create the knowledge. "In our global networked economy and society, information is an essential resource for capacity building and social and economic development. Knowledge societies are characterized by their ability to identify, produce, process, transform, disseminate, and use information to build and apply knowledge for human development" (Said Amina 2006). Scientific research and scholarly publications provide new knowledge for the national development and hence the enhancement of access to existing knowledge will be an investment for the new knowledge. New knowledge is always based on the existing knowledge and the emergence of knowledge may combine the back and forth phenomena.

Policy-planners, scholarly community and information specialists including librarians have to make much effort in a collaborative basis to aggregate the community's scientific and technical knowledge and facilitate the community access, share and utilize the knowledge to create new knowledge. Especially librarians can do this job better than others to accelerate the diffusion of knowledge and provide a platform for information seekers and knowledge developers. Librarians have a grate challenge to ensure the speedy, timely, and accurate access to information resources and take measures to overcome geographical and technical barriers to serve users in the networked society.

The world is enjoying the hasty development of the ICT, and all social and economic practices are based on the innovative technological environments in the "Digital era". Administration, banking, education and communication etc. are performed in this digital background. Linking to digital sources, providing speed online access to information, transforming and transferring knowledge

to develop existing knowledge etc. have become the critical factors in the development of the economy. This has also changed the information behaviour of people by leading them to practice with new searching strategies, more descriptive metadata, and effective use of information for their works. People tended to feel that they cannot depend only on the conventional form of printed information resources, and cannot depend only on bibliographic information and abstracts to fulfill their knowledge requirements.

New concepts like E-library, Digital library, virtual library, online library, open-access library etc. came to the scene while librarians extended much effort to digitize materials available in conventional form, and buildup digital collections to facilitate users access to online full text materials anywhere in the world.

Commercial sector has also taken the opportunity for 'Information Business' and many entrepreneurs have built full-text databases for the purposes of earning profit from document delivery, providing access facilities to e-resources etc. Password login, IP range login and login through E-Mail addresses were some mechanisms used by publishers/entrepreneurs and information brokers to control the access and unauthorized use of databases. Librarians moved to practice strategies like consortia subscription to overcome issues like rising cost for subscription to e-resources. This mechanism, however, is also a kind of controlled access and is not able to satisfy the national demand for information meaningfully. Thus developing nations in the world require quick and easy access facilities to knowledge, and librarians have the challenge to fulfill the highly increasing demand for development information in respective countries amid a networked and digitized, turbulence of information super-glut.

Objectives

The purpose of this study is to discuss the necessity of facilitating open access to the national knowledge output such as research and scholarly publications in Sri Lanka. This paper aims to discuss the key features of potential national level digital repository of information resources in Sri Lanka. Best practices and experiences from global digital archives such as E-LIS are explored and attempts are also made to identify digital repositories available institutional, national, or global level among universities and other institutions in Sri Lanka. The need of encouraging scientific and scholarly community to promote open access initiatives through self archiving is highlighted.

What is open-access:

The concept of Open-access to literature has its roots in the deep history perhaps with the initiation of the public library concept that lent printed materials free of charge to the general public. The Open-access (OA) concept was mostly occurred in the networked environment with the aim of providing quick, easy, and free access to e-resources. Actually, this has been rapidly developed since few decades with the increasing use of the Internet. The characteristics of OA include digital availability of the document, online access, free of copyright or licensing restrictions, and ability to harvest metadata and reuse documents with proper citing. Yet some OA repositories seem to be ambiguous in certain aspects as they impose access barriers through password login, restriction of full document downloading etc.

Swan Alma (2005) states that open - access came to practice in a preprint culture that was the distribution of drafts of research

articles before they have been peer-reviewed to establish commentary before final revision and submission of the articles to learned journals. While the arrival of digital age the practice of open access migrated from paper mode to electric mode.

Budapest Open Access Initiative (2002) describes the OA as "open access to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited."

OA is expected to be based on the free availability and unrestricted use. Yet, in practice, some repositories allow derivative works and some do not. Some repositories provide the permit of commercial re-use. (Suber, Peter, 2007). The Bethesda and Berlin statements explain that for a work to be OA the copyright holder must consent in advance to let users copy, use, distribute, transmit and display the work publicly and to make distribute derivative works, in any digital medium for any responsible purpose subjected to proper attribution of authorship.

The OA movements have been initiated in the purpose of removing price barriers and permission barriers and access barriers for accessing to research documents and journal articles. O A is expected to facilitate users with immediate access rather than

delayed while accessing full text but not link to abstract, metadata or summaries.

“OA is compatible with Copyright, peer review, revenue (even profit), Print, Preservation, prestige, career advancement, indexing and other features and supportive services- associated with conventional scholarly literature” (Suber Peter 2007). Following features distinguish some attributes of open-access:

- a. Availability on electronic (digital) format
- b. Online accessibility.
- c. Resources are based on the copyright holder’s consent in advance to the unrestricted reading, copying downloading, sharing, printing, linking, storing, and crawling of the full text of the work.
- d. OA is mostly used and contributed by academic scholars to create impact on research process and transferring of knowledge.
- e. No price barriers

Generally researches are based on the academic perspectives and therefore open-access concept is highly prestigious to academic scholars. Academic people publish their research and journal articles not for profit or revenue earning, but for the contribution to the professional development and also to enhance the impact on research. It is different from non-academic perspective because nonacademic view focuses on selling or earning profit from publications and research information. For instance, publishers and information brokers raise their charges for access to databases while academics write article to develop the professionalism. Today subscription charges for journals are very high. “Scholarly journals

do not pay authors for their articles and have not done so, since the first journals were launched in London in Paris in 1665" (Suber Peter 2007). In fact, academics have to pay when submitting and presenting papers in conferences.

Open access provide the access to peer-reviewed articles which are not commonly available in public libraries. O.A. encourages researchers, manufactures, technologists and learning community to enhance, uplift and promote their research culture. Open-access facilities are established by librarians and IT personnel through building up electronic full-text databases and providing free or controlled access. Resources for the open access databases are obtained by purchasing licenses, subscription for toll-access, consortia purchasing or linking to free resources available in the internet. The most effective means of promoting open-access is self archiving where researchers and authors of scholarly publications deposit their works in free access repositories. Another effective mechanism to enhance OA is to sign agreements with publishers and copyright holders to release copyright barriers on OA.

Self archiving

The development of Information Communication Technology (ICT) introduced new concepts like Digital Libraries, open-access Libraries, Virtual Libraries and e-Libraries. Consequently, librarians and information specialists moved to build up electronic resource collections instead of conventional printed collections. The practice of paper-mode archiving migrated to digital mode archiving and e-repositories were popular among researchers and scientific community. Paper-mode resources were converted in to various

forms of digital formats while many modern publications were directly published in e-formats. E-repositories can be seen in the form of institutional level as well as personal level and are built up by individuals or group of people in institutions.

E-repositories can be subject-based or geographical based and can be national level or global level depending on their objectives, theme, and coverage of resources. Most of e-repositories facilitate with boulder less access and seamless searching and unlimited downloading.

Electronic repositories are built up by profit organizations too in the aim of profiting from information. The emergence of open-access concept brought academic community to seek for free search and free download of research and scholarly articles, and therefore, free archiving was the most concern. The practice of self archiving was proliferated as the online submission facilities were developed and variety of subject level and institutional level OA collections appeared immensely. "The purpose of self-archiving has its roots in the field of Computer Science, where researchers were depositing results in ftp archives some decades ago and later on, websites" (Swan Alma 2005).

According to Wikipedia the self-archiving involves depositing a free copy of digital documents on the World Wide Web in order to provide open access to it. Usually peer-reviewed research journals and conference articles and theses are deposited by the author himself/herself or any other with the consent of copyright holder in an institutional repository or any other open archive for the purpose of maximizing its accessibility, usage and citation impact. Self-archiving is a good method to promote open-access.

Swan Alma (2005) through a research found that the main reason for authors publishing their works in open-access journals are the principle of free access for all and their perceptions that these journals reach larger audience, publish more rapidly and are prestigious than the toll-access (subscription based) journals that they have traditionally in. Swan further explains that reasons for not publishing in open access journals are that they are unfamiliar with any in their field and that cannot identify a suitable one in which to publish their work.

Self-archiving is a matter of attitudes, awareness and scholarship. Authors who practice self- archiving have to concentrate on copyright issues. Mostly authors deposit their pre-print articles before publishing in peer-reviewed conventional journals. That will be the authors final version of the article and in some cases authors should have to sign copyright agreements with the publisher or funding agency. Therefore, most of post-print articles require copyright holders consent prior to deposit them in an open access archive. Many digital archives tag the article as pre-print, Post print or peer- reviewed.

“The Budapest Open Access Initiative is focussed specifically on the refereed research literature, across all disciplines. It is the authors of these articles who should self-archive them, in order to maximize the visibility, accessibility, uptake and impact of their work. The self-archiving itself, however, though rapid and simple, can be done by “proxy,” by digital archivers in the researcher’s institution or its library. It can also be done in bulk, by (free) software (under development)” (Self-Archiving FAQ. URL: <http://www.eprints.org/openaccess/self-faq/#self-archiving#self-archiving>)

E-repositories and E-LIS

E-repositories as discussed above can be in two types: institutional archives and subject-based archives. Subject based archives provide a location to deposit articles related to a discipline or a theme. Subject-based digital repositories have a specific subject area or a theme. For instance "arXIV" is an archive which houses articles in Physics, Computer science, and mathematics. "Cogprints" is for cognitive science articles and "RePEc" is for economics.

Institutional repositories aim to provide a secure location for storage of research documents of an institution. "An institutional repository is a secure storage location for working documents or research. That it becomes the mediator for one-input, many-outputs scenario, where researcher can retrieve whichever element of his or her own research record are needed for task-in hand (perhaps writing a paper, a lecture, preparing teaching materials, preparing CV). It can also provide the home for research data that cannot be published in traditional journal format but which supports research findings and which as very large datasets, video files, graphical files of various formats, audio files and mixed media output." (Swan, Alma, 2007). Institutional archives can also provide a record of all researches of the institution. It can also serve as a marketing tool so that all research data can be published among institutional staff potential outsiders and interested parties.

Digital archives can be occupied a centralized or distributed system architecture. Centralized system archives have their own communities and concentrate on a single database and one service provider. Digital archives which are based on distributed systems

provide a global network of a number of digital archives or Institutional repositories work on an interoperable manner where users can locate the original article without any disruption.

E-LIS

E-LIS is a subject-based global level digital archive related to librarianship information science and technology and related disciplines. Using the open archiving Initiative (OAI) protocol and tools E-LIS facilitates interoperability between repository services. Being a part of RCLIS (Research in Computing Library and Information Science), E-LIS was established in 2003 as the first international e-server in the LIS field. E-LIS is organized managed and maintained by an international team of Librarians working on a voluntary basis. At present E-LIS has 9072 items in the archive. E-LIS can be searched on <http://rclis.org/>.

“The purpose of E-LIS is to make full-text documents visible, accessible, harvestable, searchable, and usable by any potential user with access to the internet. It also aims to support individuals who wish to publish or make their papers available worldwide and it can be used by LIS communities in any country” (De Robbio Antonellis and Subirate Coll, Imma, 2005). E-LIS provides multi-lingual and multi-format depositing facilities and authors can self archive their works as a proxy service supports depositors. E-LIS mostly depends on voluntarily works of people with different backgrounds and it is based on non-commercial orientation, where revenue receiving or profit gaining is not expected. This archive provides a global access to research articles and academic works of professionals in Lis field. This has been popular among scholarly community of Universities, researchers, Librarians, publishers and readers.

Organizational model of E-LIS includes three main sections of its structure: Administration, Editorial and Technical. Each section uses the discussion list as the basis for action. Strategic issues, future direction, policies, user impact and dealing with other communities ect. are handled by Administration Section. Main duties of Technical section are to implement, develop and enhance software and operation within the OAI framework. The administrative sector is the core of the organization model. And its main responsibility is to determine the international and future vision of the archive to suit the national and international needs. E-LIS mainly includes distinguished policies such as submission policy and copyright policy.

E-LIS Submission policy

The aim of the E-LIS is to optimize the research impact on the LIS field and promote the freedom of intellectual integrity. It has clear policies on governance of the archive. Policies are very important as they guide the administration to work within a framework compatible to its mission and objectives. Main points included in Submission policy of E-LIS can be briefed as follows

1. Any author in LIS field can deposit his/ her article himself/ herself.
2. Authour himself/ herself is responsible for the copyright of the article deposited.
3. Authour should be adhered to ensure the quality of the paper deposited because authours themselves are aware that their papers are virtually evaluated by a wide community of peers.

4. Author who wants to submit a paper must register in E-LIS to obtain user ID. This is also the basis for obtaining author-view browsing facilities and usage statistics.
5. Any scientific or technical document published or unpublished on Librarianship, information science and Technology can be deposited.
6. Pre-Prints, Post prints, Conference papers, Conference posters, Presentations, tools, book chapters, technical reports, developmental working papers, theses and newspapers and magazine articles related to LIS are the types of document that can be deposited in E-LIS.
7. Submission process includes registration, metadata forming, upload and submission of the article to the archive.
8. Submitted documents first appear on the Buffer (for the approval or rejection by E-LIS staff). Approval is done by the country editor or relevant staff and sent to the main archive, (approval is based on the E-LIS policies and pertinence to the archive)
9. E-Prints (the document) may return to the author for the modification if necessary.
10. Formal Corrections are made by the editor.
11. The document deposited becomes publicly accessible within two days if there is no any correction to be done by the author.
12. E-LIS supports all languages to ensure the equality and internationality.
13. If the article is not in English, it must include an English abstract and Key words to enable all users identify the theme of the article.
14. Editor can insert an English abstract on behalf of the Author.

15. Documents once submitted cannot be removed from the archive. Yet author can control & restrict the access to the document.
16. The Supported document formats in the E-LIS archive are PDF, Postscript tex, LaTeX, (DVI), HTML, ASCLL (text) power point, Ms Word, Doc, and RTE the strongly recommended formats are HTML and PDF.

E-LIS copyright policy

Generally, author holds the copyright for the pre-print (before peer-reviewing) of the publication and therefore an author can archive his/her article without seeking permission from any other. "an author's works are that author's own intellectual property and they therefore own copyright and other proprietary right until an if they grant otherwise. Authors submitting to the repository are responsible for ensuring the documents they archive do not have any restrictions on their electronic distribution imposed by a third party (such as publisher). A Pre-refereed pre-print can be self archived at a time when no copyright transfer agreement exists and so the author holds exclusive and full copy right. The author may no longer have the copyright to self archive a refereed post-print if a copyright transfer agreement has been signed granting all rights to the publisher. In general, When an article is published in a journal copyright is transferred to the publisher" (De Robbio, Antonella and Subirate, Coll, Imma, 2005).

E-LIS does not infringe the copyright and treats that all documents archived in E-LIS server are property of authors. Therefore, the author can restrict access to their papers by limiting the access to a group of registered users of E.LIS, to the depositor only, or archive staff. E-LIS follows the SHERPA database of publisher

copyright policies and self-archiving. "SHERPA is a project investigating key issues in creating, populating specifically intellectual property Right (IPR), quality control, collection development policies, business models, scholarly communication culture and institutional strategies" (De Robbio Antonella and Subirate Coll, Imma, 2007).

Various publishers have different copyright policies. Some publishers allow authors to deposit their article in open access archives; some restrict it in to institutional repository or personal webpage. However, this seems to be ambiguous and the nature of the copyright depends on the agreement signed with the publisher. In some cases it is difficult to discern the definition for Open-Access concept as publishers define it ambiguous way. However, type of access whether "open access" or "toll access" depends on the policy of the archive.

E-LIS permits all users or a third party to harvest metadata from the archive but, harvesting of full content of the document depends on the author's will of access restriction.

E-LIS editorial team

E-LIS is supported by a team of editors selected internationally on volunteer basis. Works are performed by discussion on a mailing list. Important matters such as metadata issues guidelines and promotion of e-LIS are discussed in the mailing list and a lot of editorial works are performed online.

Librarians from various countries contribute to the editorial team and their main duties are maintaining contacts with knowledge

generating LIS publishers, making publicity and promoting open access concept by writing articles. Editorial of E-LIS includes coordinative editor, regional editors and country editors.

Technical features of E-LIS

- a. E-LIS is based on OAI-PMH (Open Access Initiatives Protocol for Metadata Harvesting) which allows the public gather standardized metadata from the repository and retrieve the document if necessary. OAI framework (OAI-PMH) supports the third party to gather data from the repository, maintain metadata standards and contributes to a network of interoperable institutional archives.
- b. E-LIS is hosted by AEPIC team of CILEA.
- c. The software used in E-LIS is GNU E-print archive software which is compliant with the OAI-PMH. this is an open software developed by electronic and computer science department of Southampton University in UK (around 2001).
- d. Software issues and its development are discussed in the mailing list of technical team.
- e. Uses JITA classification schema of Library and Information Science (<http://eprints.rclis.org.jita.html>).
- f. Searching, browsing facilities are available in three levels; quick, simple and advanced.
- g. Special function like "show all fields" in E-LIS allows user to view the full list of metadata with field labels of an item. This function is important for librarians who organize metadata for their resources.

- h. 'Para Tools' reference linking is used to parse citations. By using of this Para Tools, citations are indicated if the cited document is available in E-LIS archive. This facilitates to link which will seek the item on the web.
- i. Usage statistics are updated monthly. The numbers of hit, visits and downloads are indicated numerically as well as graphically on the statistics page.
- j. Basic metadata format used in E-LIS is Dublin Core (DC). Metadata related to documents can be seen in various metadata formats such as HTML, Dublin Core, ASCII Citation, Full Metadata, Reference Manager, DIDL, MODES, EP3 XML, Simple Metadata etc. which is very useful for librarians.

Open access in Sri Lanka

Knowledge is the basis for all categories of development in any country. The philosophy that 'new knowledge is emerged on the basis of existing knowledge' is applied to every country, every society and every environment. Knowledge is acquired through research, education, training and experiencing and all these elements are associated with information - the ingredient which is transferred to the knowledge. Knowledge seeking and knowledge generation are interrelated process that leads to the national development, and therefore, developed countries have given priority to manage the knowledge by aggregating scattered knowledge, organizing them and providing access facilities to them.

Sri Lanka is not poor in the practice of aggregating and transferring knowledge. Our education system in the history has proven that the country had a good method of transforming and transferring knowledge among the community. Yet, in the innovative technology

driven global context the country cannot survive with the existing conventional methods and needs to practice new methods to aggregate scattered knowledge, organize it and transfer the knowledge among communities. Country needs to enhance the use of this knowledge for the national development.

Methodology

This study engaged in a sample survey by distributing a structured questionnaire among university librarians and Special librarians in Sri Lanka to gather data related to Digital repositories available. Investigations were also made through logging onto websites of relevant universities to seek for the availability of digital repositories linked to their web-pages.

Primary step undertaken by the author to identify available e-repositories in Sri Lanka was the circulation of a questionnaire among librarians of the mailing list of "Library Friends" (library_friends@yahoo.com) and requesting them to inform whether they have digital repositories at their institutions. Library Friends is a Yahoo user Group formed by librarians of Sri Lanka to discuss various matters related to librarianship, professional development, and for the sharing of information and view points. This mailing group is served by a majority of Librarians of Sri Lanka.

As the second step a questionnaire was distributed among 30 Special and Academic librarians in Sri Lanka. Special Libraries and Academic libraries were selected as these libraries represent government institutions, semi-governmental bodies and universities which, are quite structured with administration, and supported with

clear financial allocations. Librarians were selected as they normally have contacts with other departments of the institution and mostly building of digital resource collections is potential within the library or elsewhere with the knowledge of the librarian.

The questionnaire was aimed to obtain data mainly related to the organizing and maintaining of the repository, type of the repository, subject coverage, format of the resources, language coverage, who can deposit resources, method of deposit, availability of self-archiving facilities, type of software utilized, metadata format (classification), governing authority, users, and statistics and report facilities of the repository.

Search on websites of above institutions were also made to identify and explore the availability of digital open access repositories.

Findings

04 respondents have indicated that they have a digital repository while 06 respondents have stated that they did not have any kind of e-repositories. The rest (20) have not responded and therefore, the author assumed that they do not have any kind of e-repositories based on the open access philosophy. Although 02 respondents among them have informed that they had such kind of e-repositories, they did not return the questionnaire. Author did not find any link to such e-repository on their web pages.

Table 1 explores the main features of the available e-repositories.

Table 1 - Main features of available e-repositories

Feature	Institute	Central Bank	Southeastern University of Sri Lanka	Industrial Technology Institute
Type of Repository	National level (NR)	Institutional Level (IR)	Institutional Level (IR)	National level (NR)
Subject coverage	Agriculture, Chemistry, Computer Science, Earth Science, Engineering & technology, Humanities, Library & Information Science, Life Science/Biology, Mathematics, Philosophy, Social science/Education	Social science/Education	Business and Management	Agriculture, Chemistry Engineering & technology,
Resource types	Book Chapters, pre-prints, journal articles, Theses abstracts	Central bank publications	Journal article, Guides, manuals, research papers	e-books, newspaper articles.
Resource formats	PDF, HTML	PDF	MS Word	PDF, Power point
Language/medium	Sinhala, Tamil, English	English	English	English
Governance/maintenance	Head Library and Resource Centre	Librarian/Officer in charge	Librarian	Officer in charge
Software	D space	Lotus notes/LIBSYS ???	Greenstone	D space
Metadata format	Dublin Core /WINSIS	-	-	Dublin Core
Who can access the repository	<ul style="list-style-type: none"> • free access for Staff/visitors to NSF. • Paid access • Free access through the internet 	Central bank staff only (on premises)	Institutional staff (on premises)	free access for Staff/visitors to ITI (on premises)
Submission mode	<ul style="list-style-type: none"> • Online submission, • By floppy/ CD/Removable Disk 	<ul style="list-style-type: none"> • Online submission, • By floppy/ CD/Removable Disk 	Removable disks	Removable disks
Who can Deposit resources	Librarian/Author of the resource/Editor of the archive	Librarian	Librarian	Officer in -charge

Source - Research data (This table was totally based on the data provided by respondents)

According to the above table several institutions have attempted to build up e-repositories, and two institutions- National Science Foundation (NSF) and Industrial Technology Institute (ITI) have launched programmes to build up national level e-repositories. Yet, it is found that only the National Science Foundation (NSF) has launched initial steps to implement an e-repository which is based

on open access concept. This is also still in the testing age and not covering wide prospect of national knowledge output. It is also revealed that NSF e-repository is still not fully accommodating the Self-archiving as its server capacity is limited.

According to respondents they have various problems encountered in the establishing and maintaining of E-repositories in Sri Lanka viz. unavailability of sufficient server capacity, insufficient support from IT personnel, inadequate training, lack of know how, and unavailability of compatible on-line payment facilities.

This study occupied a searching of websites of universities and other institutions in order to find out whether facilities for open access to resources are available. Findings indicate that, universities and other institutions specially, their libraries have made links to facilitate the access to free resources of the internet. They are also providing online access to e-resources obtained through paid subscription (toll access), consortia purchase, special programs such as PERI etc. They have arranged the access through subject gateways, links to URLs of websites, institutional e-publications, scanned documents, circulars, past papers of examinations, guide books etc. deposited in their server machines.

Some universities have established open access repositories in the Intranet to share resources among their staff. E.g. Engineering Faculty of University of Ruhuna provides tutorials, lesson plans, computer software etc. to its staff through their intranet.

This study indicates that a lot of universities and institutions have positive approaches to open-access concept where many of them have attempted to initiate open access repositories using their

server machines. Almost all of these initiations seem to be based on the personal interest of the staff rather than institutional projects. The success of these attempts seems not reachable because of the unavailability of proper mechanism by authorities of institutions and due to lack of a proper plan to encourage them. Another factor that the process is hindered is the lack of positive attitudes among responsible parties toward the open access concept.

The *Sri Lanka Journals Online* (SLJOL) maintained by NSF is a good approach to create a e-repository of research and scholarly publications in Sri Lanka. The purpose of SLJOL is to provide access to Sri Lankan published research, and increase worldwide knowledge of indigenous scholarship. This covers a lot of journals published in Sri Lanka with access to full text articles. However this is a kind gateway to provide digital access to journals and not a content repository that facilitate the interoperability.

Conclusion and suggestions

Knowledge is the basis for the development in any country and the philosophy that "new knowledge is emerged on the basis of existing knowledge" is applied to every country or economy. Generally knowledge is acquired through research, education, training and experiencing and all these elements are based on the capacity of information available. Knowledge seeking and knowledge generating are interrelated as professionals, scholars, researchers and any other component of the society act dual role as consumers (knowledge seekers) as well as knowledge creators. An effective and efficient knowledge management system is essential to the country for the proliferation of scholarship and research culture. The world trend that is establishing of open-access archives seems to be one solution.

Developing nations require the access to innovative knowledge products without geographical, technical or other restrictions. Therefore, they need to overcome the issue of 'digital divide' which deprives the user from accessing to innovative knowledge in various environments. Developed countries have achieved their development by proliferating knowledge output in the means of diffusion of knowledge to the community in a networked environment.

As a whole, economy of Sri Lanka is governed mainly by the Government and semi-governmental organizations and the private sector as well as various Nongovernmental organizations. Approximately 45 government departments and 280 statutory bodies contribute to the handling of economy in Sri Lanka while, 17311 NGOs support the economic, socio-cultural, political and educational activities in the country.

According to the UGC website, there are 15 universities, 03 Campuses, 07 Postgraduate institutes, 04 other government universities, and 16 other institutes engaged in teaching learning, and research. There are about 13 other institutions governed under several ministries which are engaging in research and development activities, professional development and inventions in Sri Lanka. Nearly 6000 academic and academic supporting staff works in universities while 2000 postgraduate students and approximately 12000 undergraduates attached to various disciplines engage in research and scholarly activities in the university system. In addition, vocational training institutes, technical collages, tertiary education institutes and the school system of the country are parts of the knowledge based economy. All these segments contribute to the generation of knowledge in various levels in variety of quality and quantity.

Academic communities, professionals, independent researchers, subject specialists, practitioners, and general public in a broader sense contribute to the knowledge output of the country. Knowledge output represented in the form of research reports, journal articles, technical reports, work plans, inventions, tutorials, lectures, monographs, software, presentations and many more. The products created by knowledge communities seem to be unrecorded, unidentified and scattered due to unavailability of a proper system that accumulates, transfer and manage them under a national plan.

It is a good tendency that National Library and National Archive of Sri Lanka maintain national level repositories of printed resources under the theme of 'preserving the Memory of the Nation'. National Library follows positive acquisition policies to aggregate resources in two-way approach that current and retrospective collection of national knowledge output. This acquisition policy is supported by the Legal Deposit law imposed through 1839, 1885, and 1902. The National Catalogue of the National Library helps to harvest bibliographic data of printed resources available in the country.

Yet, the problem exists with this conventional archival system is the nature of 'closed access' which controls and restricts the transfer of knowledge to the community. Paper-mode conventional archival systems cannot provide simultaneous access to their resources for a large scale of community as the access facilities are available only within the respective premises. On the other hand these conventional archives are not accommodating information sources such as journal articles, tutorials, technical reports which represent the knowledge output of the country and which are important for knowledge seeking community.

Sri Lanka as a developing country needs to establish a system that can organize and coordinate the scattered knowledge-output of the country. Open access e-repository operated in a networked environment will be a good solution for this. This can be a centralized system where all the resources are deposited and all the subjects are accommodated in a central server governed by a government authority, a university or any other institution like National library. Regional coordinators selected from institutional level can support the repository by accumulation of resources in the region, keeping contacts with authors, and implementing promotional programmes to encourage depositors to submit their articles. Editorial team should include subject specialists in various disciplines and librarians as well.

The most recommended system will be a distributed content management system where a number of institutional repositories are combined by an interoperable system and governed by a number of regional teams. The cooperation and coordination under a national programme will be much important in this regard. Network of Institutional repositories can be effective because institutional level teams can work in collaboration to identify knowledge creators, accumulate knowledge products and promote the repository in regional basis. Mostly this can be an interoperable system of a main archive and several other subordinate repositories such as national level subject-based e-repositories and Institutional Repositories.

Best practices occupied in successful open-access archives can be followed in the formation of e-repository in Sri Lanka. E-LIS is a subject based centralized open-access archive which relies on a self-archiving phenomenon. Its organizational architecture, policies,

governing pattern, software and technical utilities, and many other added features can be used in the formation of a model for Open Access archive in Sri Lanka. Following are some important factors to be considered when designing and establishing an open access e-repository in Sri Lanka .

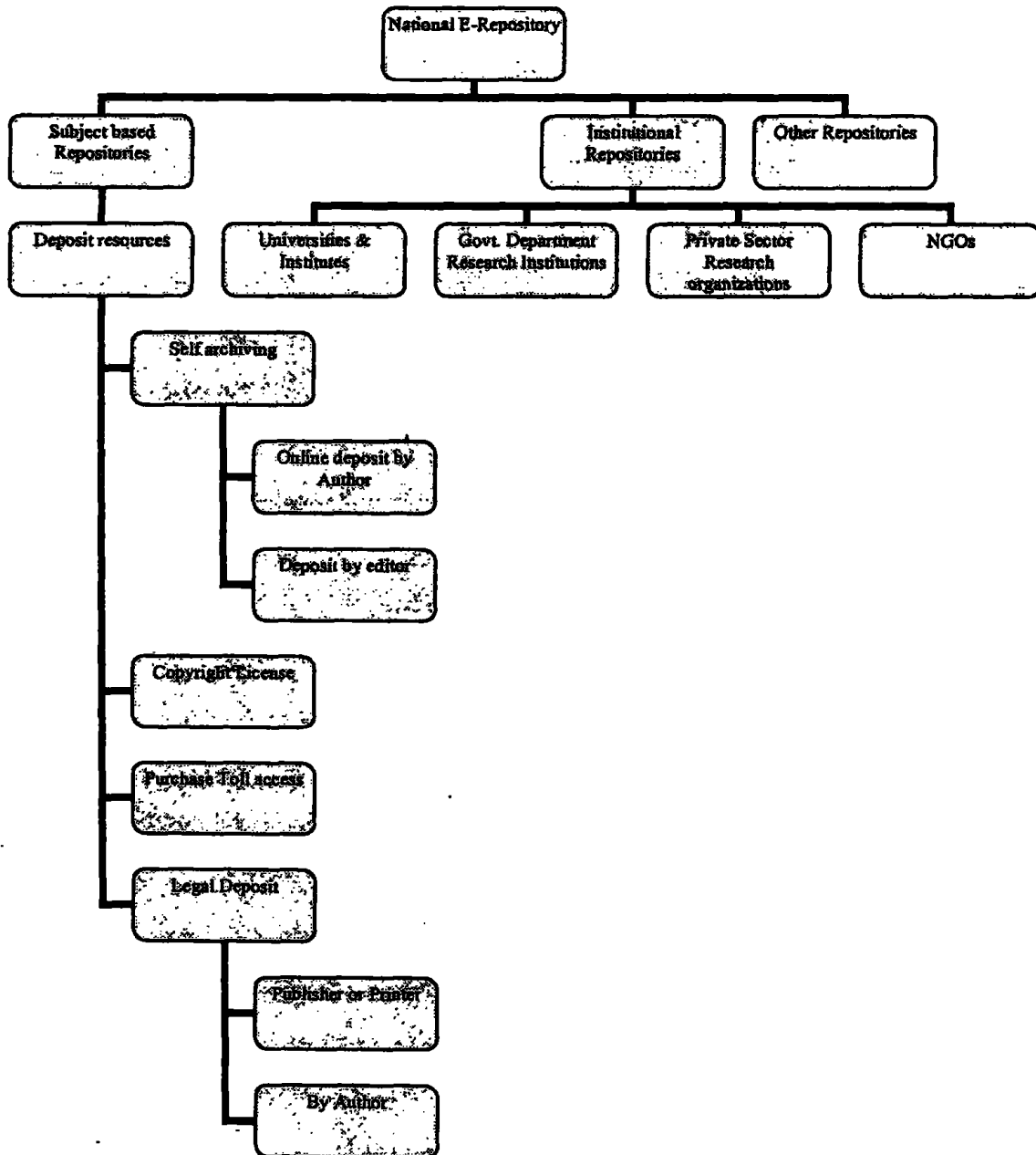
- a. Identify available e-repositories among universities and other institutions in Sri Lanka and launch a programme to cooperate and coordinate them to bring them under a national level umbrella.
- b. Establish regional level e-repositories in collaboration with universities, government departments, and other institutions.
- c. Form the architecture of the governing team of the open-access archive with representations from academics, professionals, librarians, subject specialists, and IT personnel. Administrative team, editorial team, and technical team need to be represented by experts on regional /institutional basis.
- d. Support of the team should have a volunteer basis as the unlimited formal and informal support of editors, authors, publishers, technicians, professionals and other knowledge developers is essential to develop the repository.
- e. Promotion of positive attitudes towards the OA among communities is essential
- f. Funding for the project should be made by a government body such as a university, National library, National Science Foundation or any other institution.
- g. Both Legal deposit Law as well as the Self-archiving mechanism can be used to accumulate resources and enhance the content of the repository.

- h. Self-archiving requires a volunteer basis as authors' and copyright holders' consent is essential to deposit their work in public access repositories. Success of the self archiving depends on the reliability of repository, its policies, authors' attitude, and services provided by the archive.
- i. The Open-access archive should have clear policies and guidelines.
- j. The services of the archive should be noncommercial and non-profit oriented.
- k. Software and technical utilities should ensure the user-friendly format, convenient medium, and accessible type of resources. National languages like Sinhala and Tamil should be accommodated in the archive.
- l. Additional abstracts and Key words can be prepared for the documents in a common language like English so that the user can locate interested items without bothering on the medium.
- m. Suitable software should be selected. There are a lot of content management and digital archiving software freely downloadable from the internet. E-prints, Greenstone, D space are some of them.
- n. A classification system should be used to categorize and tag documents into various subjects and resource types.
- o. Content of the e-repository should cover a wide range of resources such as research, journal articles, working papers, technical reports, conference papers, presentations, lectures, lesson plans, models etc. so that professional communities can get benefits from the archive for teaching & learning, and research.

- p. Harvesting of metadata and full document should be facilitated online and download of full document can be controlled by rating the as free, paid, and non-downloadable.
- q. Author or depositor should be allowed to decide whether his/her resource in the archive be free, controlled access, or restricted.
- r. Mechanisms like IP login, Password login, or Registered-user login can be used to manage the access.
- s. Resources in the e-archive can be cover two-way approach current and retrospective. Mechanisms should be taken to digitize paper mode resources.
- t. Copyright barriers can be overcome by practicing strategies used by other global archives. E-LIS uses SHERPA, Budapest open-access initiative, Creative commons list etc. to share resources. This can give a light to the framework of OA archive in Sri Lanka.
- u. Measures should be taken to convince authours of the benefit of depositing their resources in open access repositories. There are some authours who believe that they lose ownership and commercial value of their works by depositing them in OA archives.

Figure -1 indicates the possible structure of the National E-Repository in Sri Lanka. Main E-Repository may be supported by several interoperable Subject Based National Repositories as well as by Institutional Repositories. Depositing of resources in the archive may be done directly by the authour online or by the regional/institutional editor. Resources may be acquired through self archiving, legal deposit law, purchasing copyright license etc.

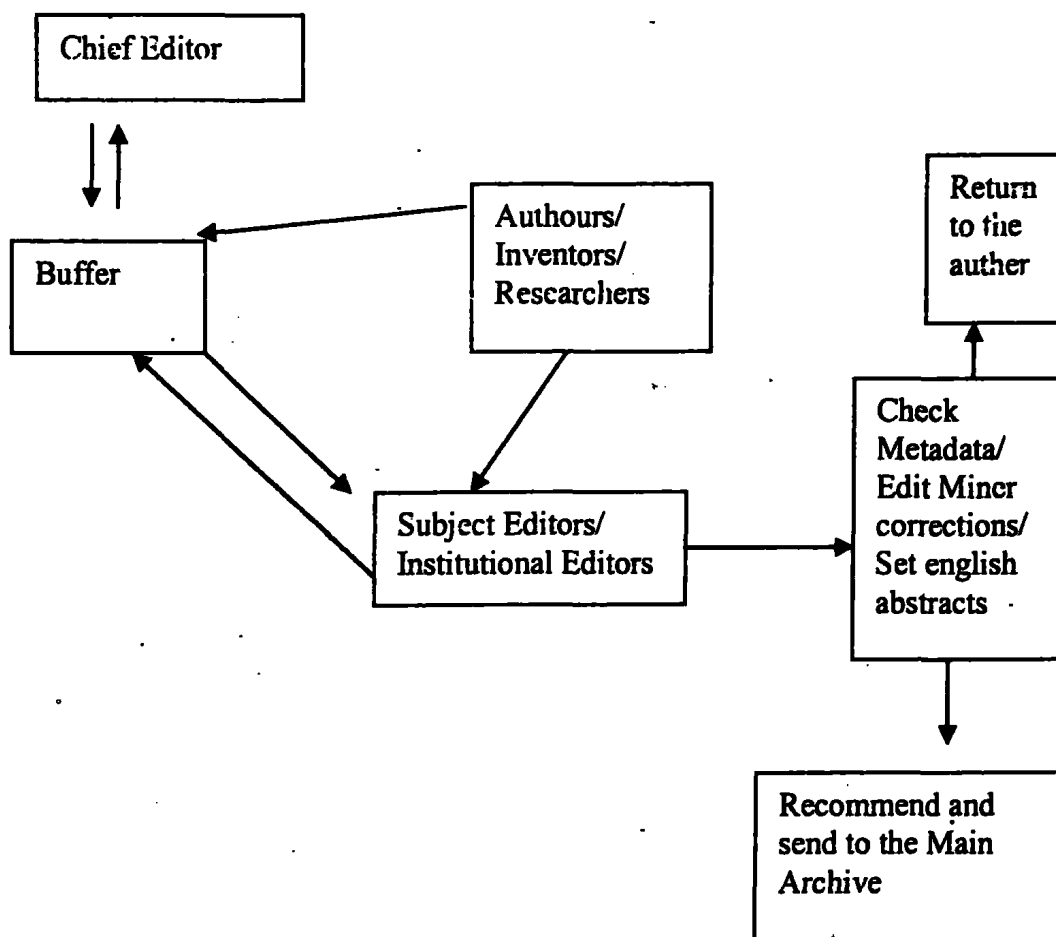
Figure -1 – Possible structure of the National E-repository



Organizing structure of the e-archive may consist of an Editorial Team, Technical Team, and Administrative Team. Editorial Team may include Editors of Subject Based Repositories and Institutional Repositories. Their main job can be to edit deposited articles in the Buffer, send them to the main archive or return them to the author if corrections are required. Editor may also contact with authours, encourage them for self archiving, and help them to

deposit articles. All the technical matters software or hardware may be done by the Technical Team. Administrative team may include the Chief Editor, other editors and technicians. The main role of the Administrative Team may be policy making, promotional activities, taking strategic decisions, trouble shooting and all the governing activities. Figure 2 outlines the possible process of depositing resources in the archive.

Figure 2- Process of depositing Resources in the archive



There are various issues too in the initiation of E-repository in Sri Lanka

1. Majority of the knowledge output in the country is still occupied in printed mode and need to be converted into digital mode.

Software should be created to accommodate digitizing of Sinhala and Tamil texts.

2. Majority of copyright holders show their reluctance to deposit their articles in free access OA archives due to fear of loosing commercial value for the resources.
3. Many authours have already published their articles in commercial publications and hence not able to deposit a copy in OA.
4. Authors are hard to convince of the benefits and research impact of their work by depositing them in OA databases.
5. Authours have fear that OA database holders collect resources and earn profit from them by selling them to commercial businesses.
6. Infrastructure and technical requirements such as server space are limited
7. Lack of expertise and know-how among librarians who are dedicated to enhance information services to the community
8. Lack of proper authority and national plan to initiate the project

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Paper Presentations

Session - 03

*Strategies of Scholarly
Communication*

A Study on consortium to access E-Journals to meet the information needs of the academics in Sri Lankan universities

P G R Samaravickrama

Abstract

This study is an attempt to investigate how far the consortia can provide access to e-journals to satisfy needs of academics in Sri Lankan universities. This study was focused only on Science and Engineering faculties. It was revealed that 75% of the university librarians have accepted e-journal consortia, as a useful effort for the information needs of their universities and 31.3% of them have affirmed that this great effort of e-journal consortia is an essential to overcome the budgetary problems of the universities regarding journal acquisition. The special feature of the study revealed were all most all the (97.63%) university academics were interested in more specific as well as subject related information through the consortia as online databases in the future than present. Therefore the recommendations should be directed to the academic's requirements in e-journal acquisition.

Keywords: *E-journals, online journals, consortia*

Introduction

Libraries are increasingly being called upon to provide more relevant, current and timely information to a wide range of users. Users require availability and accessibility to a variety of information resources and formats (such as digital full text, sound, graphic, multimedia and hypertext) to satisfy their information needs. The libraries in Sri Lanka, like in most developing countries suffer from inadequate funding and/ or stringent budget cuts. This has affected the level of services offered to both in terms of quality of collection and the degree of staff support provided. In this kind of situation only a few libraries can afford to have a wide range of information resources within their budget.

It is equally true and applicable, for all types of libraries cannot hold the full stock of information resources or to procure all information that may be in demand by its readers. None of the libraries can meet the thrust and demand for knowledge of all readers through its collection even if information is up to date to the fullest extent. To solve this problem library cooperation came into being. For example, Library Networks, ILL, Document Delivery and Library Consortium etc. They are internationally accepted resource sharing practices. At present the mostly accepted system of resource sharing is library consortia that have come into existence with wider coverage. The main purpose of library consortia is to facilitate easy access to available resources and services to a wider category of users while sharing costs among them.

Library consortia have existed for decades and have fulfilled multiple tasks. Historically, the common form of library cooperation was the sharing of union catalogue information, storage facilities, collection development, and human resources at local, national and regional levels (Henty, 1993; Payne, 1998).

The information revolution and proliferation of information have brought about drastic changes to the functions and services in all types of libraries in Sri Lanka. None of the libraries in Sri Lanka today are in a position to afford to procure all documents and subscribe to all core journals in major disciplines or CD-ROM databases due to the financial and other constraints. Librarians experience that their budgets are shrinking yearly and at the same time the prices of journals are increasing. As a result, in Sri Lanka, library networks started to share resources among them.

More recently advancement in digital information and telecommunication technologies has dramatically revolutionized the way in which information is acquired, stored, accessed and transferred. Sharing electronic resources has rapidly become another important goal for library consortia.

Currently, most scholarly e-journals are available through packages. This means that a large number of journal titles are included in full text databases. Access to the databases is obtained via licenses and favorable prices are offered if many institutions come as one customer through a consortium. The proliferation of World Wide Web-based e-journals and the development of more sophisticated retrieval tools on the web have undoubtedly ensured that these journals are more easily accessible to academics.

Objectives

To investigate into the extent to which the "Consortium to access e-journals" established by Sri Lankan Universities, could overcome the problems of journal acquisition and to satisfy the information needs of academics.

Specific objectives of the study are given below.

1. To find out the journal acquisition process in university libraries in Sri Lanka.
2. To find out the problems faced in journal acquisition in Sri Lankan universities.
3. To identify the journal needs of academics in the universities.
4. To investigate the present status that has been adopted to introduce e-journals by universities.
5. To investigate the current situation of using e-journals and tendency of acceptance of the e-journals by academics in Sri Lankan universities.
6. To investigate into the current status and the future trend of presently available "consortia to access e-journals" to fulfill the information needs of university academics.

Survey methodology

Researcher adopted survey method to conduct this study. The teaching community in Faculties of Science and Engineering and all the librarians who are in charge of journal acquisition in 13 national universities were considered as population for this particular study. Sample from the university academic community

was drawn using stratified random sampling method in which the population was subdivided in to strata, which are not overlap by one another. It was carried out before selecting the sample. "University" and "Major Subject Areas" in Science and Engineering Faculties were identified as the criterions for the stratification. The sample was selected to represent each stratum proportionately. 30% of each stratum was taken into account. The academics to be surveyed were chosen randomly from within each "Major Subject Areas".

Analysis of responses

In August 2005, 281 questionnaires were distributed over Science and Engineering faculties of 13 Sri Lankan national universities to collect data from the academics. The response rate was 87.9% (247). Respondents according to the faculties was as Table 1.

Table1: Response rates as faculties

Faculty	Count	Percentage (%)
Engineering	91	36.8
Science	156	63.2
Total = 247		

Table shows that the largest percentage (63.2%) of respondents is from Science faculties and 36.8% is from Engineering Faculties. It is because the largest number of users in the population was from Science faculties. Majority of the respondents (65.6%) were senior lecturers and the lowest percentage (8.5%) was professors and there were 25.9% lecturers. 31.98% were females and 68.0% were males out of the respondents of the survey.

At the same time data collected from all serial control librarians within these 13 universities in order to find the information on printed and electronic journal acquisition process. Faculty libraries were contacted when they are separated from main library. All the libraries contacted were responded. Therefore, a response rate of 100% could be achieved.

Journal acquisition process of university libraries

Sri Lankan universities subscribe to journals through local agents, foreign agents, directly from publishers and other ways such as through consortia. Librarians were asked the way that they adopted in subscribing to print as well as electronic journals. Results are given in Figure 1.

Figure 1: Distribution of methods adopted by libraries to subscribe journals

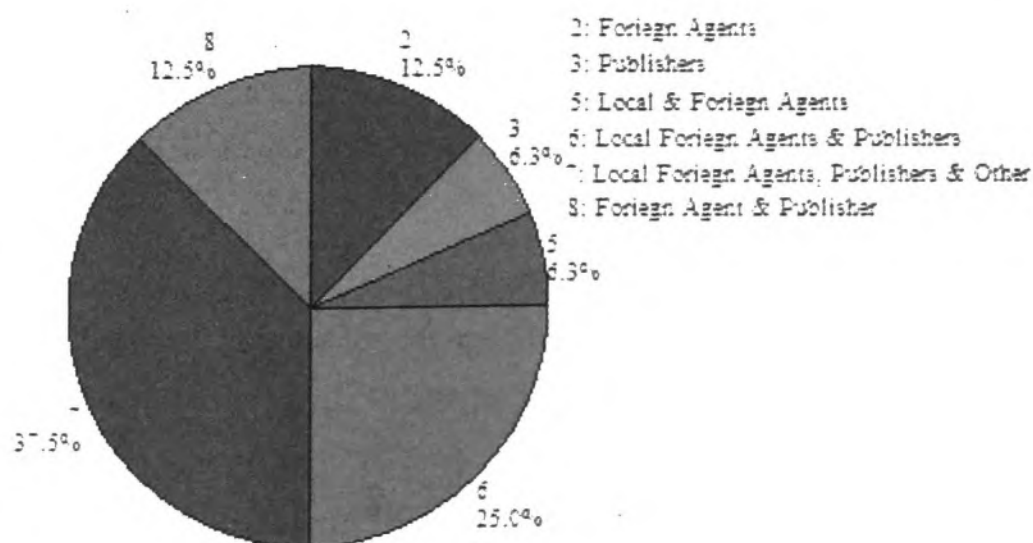


Figure shows the largest percentage (37.5%) of university libraries subscribe to journals through local agents, foreign agents, directly from publishers and using other ways such as consortia. Further, it revealed that they have subscribed to electronic journals mainly through the consortia.

The mean budget spent on Science and Engineering journals during the period of 2000-2004 by Sri Lankan universities shows in Figure2.

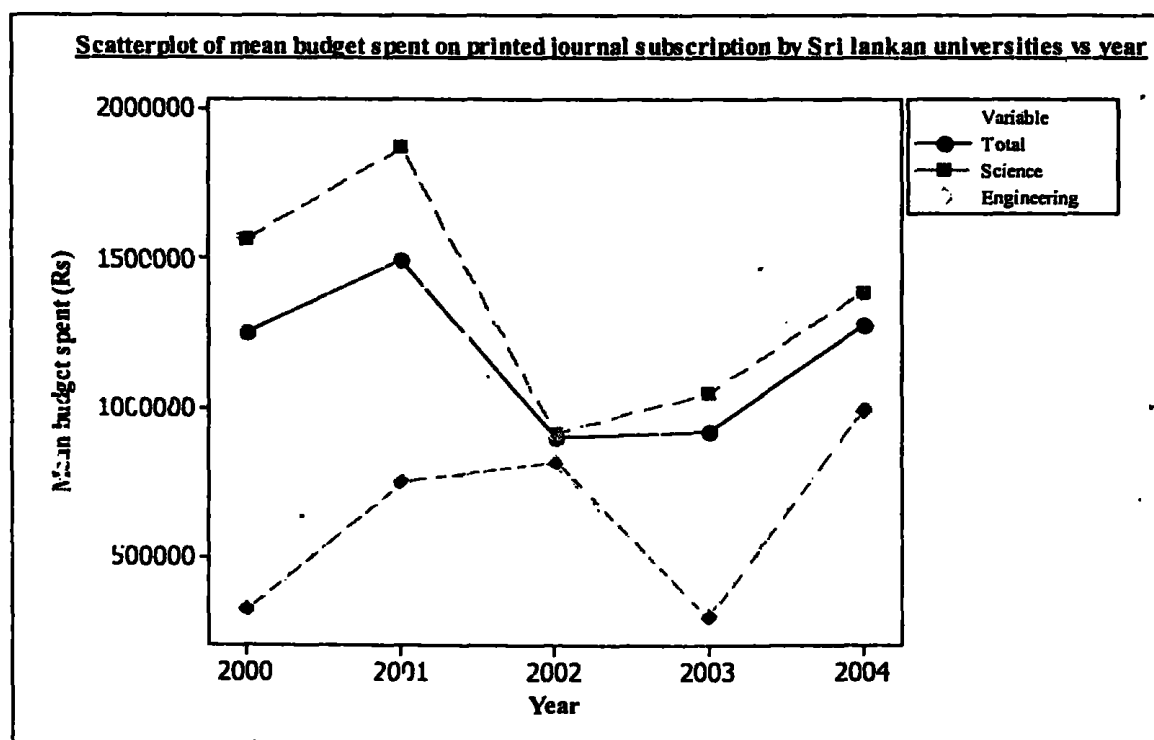


Figure 2 : Scatter plot of mean budget spent on journal subscription by Sri Lankan universities Vs year

It shows that the mean budget spent on Science journals is higher than Engineering. Further it shows that the mean budget for Science and for total mean budget (Science & Engineering) rapidly decreased at the year 2002. It may be because the Sri Lankan government at that year cut down the university budgets. But the mean budget spent for engineering titles has rapidly gone down at the year 2003.

Problems faced in journal acquisition

Problems faced in acquisition of printed as well as electronic journals were asked from the responded main libraries and the faculty libraries. The major problems they indicated were,

- ◆ Unable to meet the demand within the allocated budget
- ◆ Time taken to process an order and send the payments
- ◆ Time taken to receive a journal from the publisher
- ◆ Percentage of missing issues
- ◆ Journal issues lost after receipt at the library

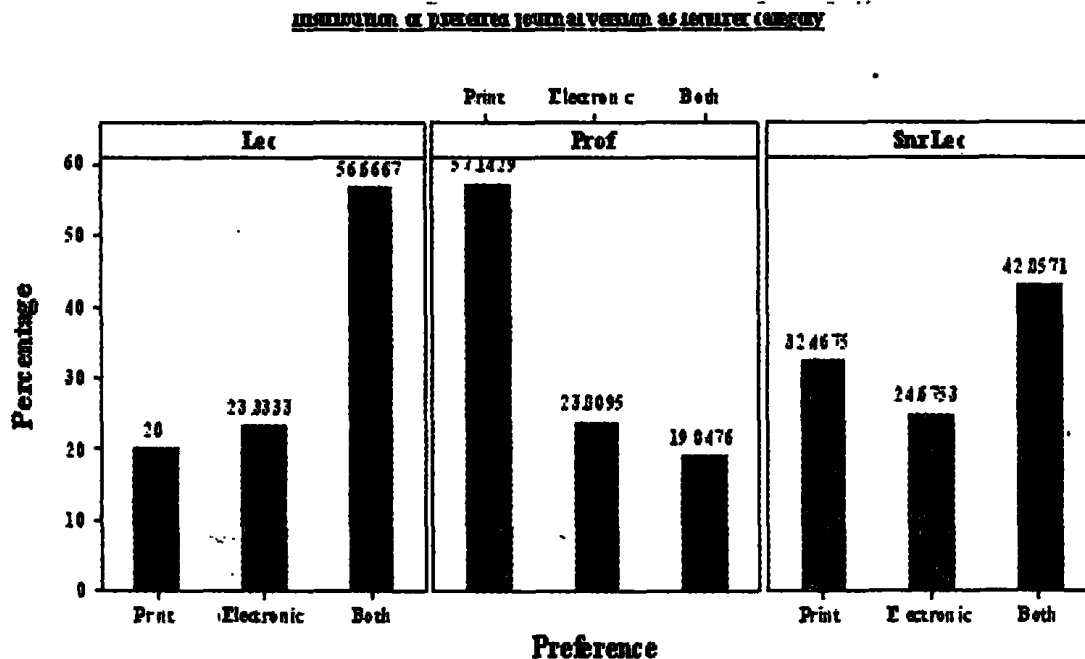
Further it was revealed that the largest number of respondents mostly face the problem of finding adequate funds to meet the demand for journals within the allocated budget of their universities. The time taken to process an order and send the payments, as well as time taken to receive a journal from the publisher, are also the other major problems in journal acquisition.

Journal interests of academics

Academics were asked about their research interests in order to identify their needs of journal. They have provided more than hundred varieties of research interests. Most of the academics, 49.6% (116) prefer to use printed journals rather than electronic journals. They have stated that the reason as the readability. It is more convenient in printed form and they are available continuously in their libraries with less interruption. Only 12.8% (30) prefers both versions equally and 37.6% (88) prefers electronic journals more. Most of them stated that they favor electronic version as they can have e-journals at their desktops without walking to the university library and it saves their time for other academic activities.

The preferred journal version differs as lecturer categories.

Figure 3: Distribution of preferred mode of journal publishing as lecturer categories



As shown in the above figure most of the professors preferred to use printed journals other than electronic. This may be since the professors have been using printed journals for a long time and they may prefer further the same version. The relevant percentage is 57.14%. Junior lecturers prefer both versions of journals. That may be because according to the availability of them.

The preferred mode of journal publishing differs as age groups of academics. Young aged lecturers mostly prefer to both printed and electronic versions. The interesting feature of the figure is 100% of above 60 aged academics preferred only to refer printed journals. Reason may be since aged persons are not mostly familiar with the novel technologies.

Journal usage of academics

Most of the academics, 93.5% (231) normally use printed as well as electronic journals for their teaching, learning and research activities and 6.5% were non users. 25% of the non-users stated that they have no time to go to the library to refer journals. Most of them preferred to have journal articles at their desktops as online full texts. The rest of the non-users (16.7%) stated the reason as not necessary to refer journals since they are able to download more and more articles through the free sites on the Internet.

Respondents, who used journals normally, were asked which mode of journal publishing (printed or electronic) that they mostly used in their information needs. 49.57%, (50) mostly used printed journals. While 37.6% (38) of respondents used electronic journals, 12.8%, (13) used both printed and the electronic journals. Most of the university academics prefer to printed journals for their journal needs. That may be the reason to use more printed journals than electronic versions. The academics that are equipped with IT facilities in their universities have mostly used electronic journals than printed.

In addition to that, libraries were asked their views on the usage of printed journals by academics in their libraries in order to identify further the journal needs of academics. Librarians were asked whether the printed journal usage is high, moderate or low. The printed journal usage is moderate for 42.85% of university libraries. It is high for only 21.42% of libraries and low for 35.715 libraries. According to these results it is clear that there is only a moderate usage of printed journals in Sri Lankan university libraries and the

invention of the online e-journals seemed to make a difference on the usage of journals.

E- journal consortia in universities - present situation

With implementation of the Sri Lankan university consortia, most of the university libraries joined to subscribe to electronic journal databases. Therefore the university libraries as well as the university academics changed their environments in adopting to online e-journals.

University libraries

University libraries have increased their facilities, made the awareness programs and service enhancements etc. Libraries were asked whether they have access to free electronic journal databases through Program for Enhancement of Research Information (PERI) of International Network for the Availability of Scientific Publications (INASP). Five universities out of 13 were not providing access to these online journal databases. They stated that they do not have access, they are not aware about these resources; they do not have sufficient infrastructure facilities and insufficient trained staff as reasons for not having access to electronic journals.

University of Colombo which is one of the oldest and a traditional university in Sri Lanka and the University of Moratuwa which is a famous university especially for its developed infrastructure facilities, reported a higher usage of access to electronic journal databases provided through PERI project. University of Colombo conducts a vast range of postgraduate courses. Therefore the

number of users enrolled in the university is high. That may be the reason for its high usage of electronic journal databases. University of Colombo has allocated the maximum number of computers for the users in accessing e-journals. These libraries have exploited four ways to make their users aware of these resources. These are conducting orientation programs and user seminars/ workshops, circulating leaflets/ brochures and notices.

Most of the university libraries (64.28%) have no sufficient facilities to provide access to e-journals for their users. They were specifically asked the reasons for the absence of e-journals in their libraries and whether they plan to implement access to e-journals in near future. Financial problems, lack of sufficient knowledge, Infrastructure facilities/ technological issues and lack of human resources were the major reasons they recorded.

University libraries were asked whether they have provided access to e-journals through their library websites and given facilities on the web pages. 90% of the university libraries have provided access to e-journals through their library websites. All of them have provided URLs of e-journal databases, which were provided through PERI project.

The libraries, which provide access to e-journals, were asked whether they are planning to enhance their service in the near future. 100% of them have already planned to enhance this special service in the future.

Academic staff of universities

University academics have changed their scenarios in adopting electronic journals. They were asked whether they were alert

about free access to electronic journals provided through the 'consortia to access e-journals' of PERI project. 72% of them have known that they can access to free e-journals provided through their libraries. Other 28% of university academics have not known about that service.

Academics were asked the way that they got to know about these free access electronic journals provided through PERI project. The largest percentage of respondents has got to know about e-journals through their libraries. The percentage is 89.84%. They have attended to the workshops/training sessions held by libraries or received the notices/ handouts as well as e-mails from their libraries and a few have got to know through their library websites. This may be reasonable since university libraries disseminated an immense range of programs to inform about e-journal databases. Most of the academics (58.59%) have used free trials or e-journals accessible through Internet. Other 41.41% of academics had not used them because they are heavily used to refer textbooks other than journals; time taken to download e-journals since slow downloading (low bandwidth), non-availability of subject related journals, satisfied with printed media, lack of awareness and not having facilities in the departments. Out of these non-users the largest percentage (39.2%) stated that they have no facilities in their departments to access e-journals.

Further the e-journal users were asked to indicate the databases, which they browse mostly. Results were as Table 2.

Table 2: Number of specific e-journal users

E-journal Database	Number of users (Percentage from the total)
JSTOR	1 (0.4%)
Medline/ Pubmed	1 (0.4%)
IMech	4 (1.6%)
CABI	5 (2.0%)
IEEE	10 (4.0%)
H W Wilson	20 (8.1%)
EBSCOhost	21 (8.5%)
ScienceDirect	29 (11.7%)
Emerald	32 (13.0%)
John Wiley	46 (18.6%)
Blackwell-Synergy	61 (24.7%)

Table 2: Number of specific e-journal users

Table shows that the largest percentage of respondents in Science and Engineering field has used the Blackwell-synergy e-journals database. 18.6% of academics in Science and Engineering field has used John Wiley database.

Problems faced in accessing e-journals

The largest percentage (66.07%) of users faced the problem, lack of Internet facilities to access these e-journals at their universities. The facilities cover elementary computer labs, virtual spaces, student computer launches etc. The next major problem is not having sufficient number of computer terminals at their departments where they have Internet facilities.

- ◆ **Main advantages of e-journals**

The largest number of respondents mostly ranks the benefits by timeless availability of e-journals. Availability before print version is also a major advantage of e-journals.

- ◆ **Main disadvantages of e-journals**

The largest number of respondents mostly faced the disadvantage of slow download of e-journals. Most of the lecturers stated that the downloading speed of articles have become a major disadvantage regarding e-journals. Further it was revealed that the additional payment for the electronic version of journals has also become a major disadvantage.

Current status and future trends towards e-journal consortia

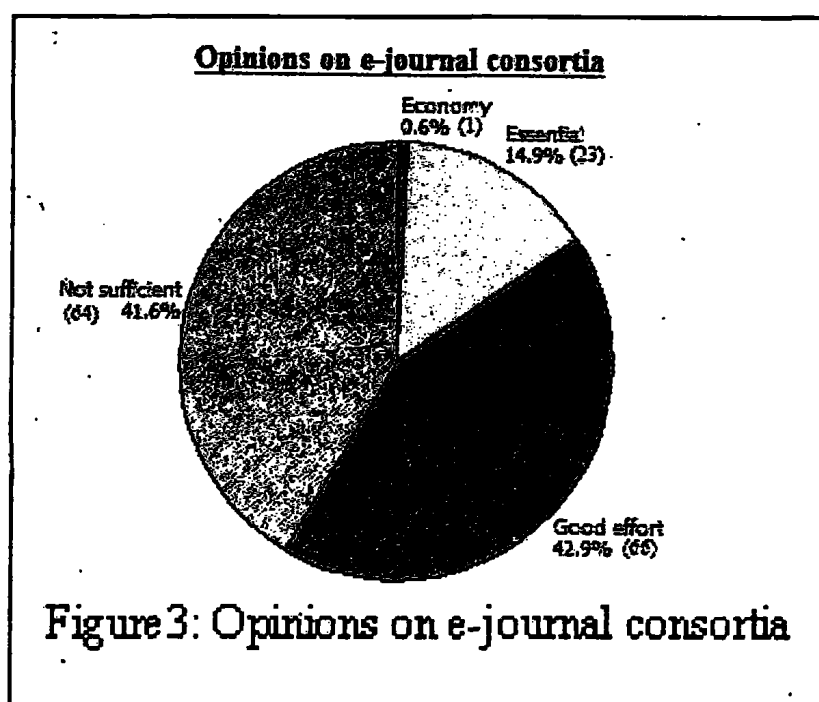
Views towards current status of the e-journal consortia

- ◆ **As university Librarians**

Librarians were asked whether the access to electronic journals through the consortia is useful or not fulfill the information needs of their users. 75% of the university librarians have accepted e-journal consortia, as a useful one for the information needs of their users.

- ◆ **As university academics**

University academics were asked their opinions on e-journals consortia in fulfilling their information needs.

Figure 4: Opinions on e-journal consortia

According to the figure, the largest percentage (42.9%) of academics has stated that the e-journal consortia as a good effort for their current information needs. But a closer percentage of users (41.6%) have reported that the e-journal consortia effort is not sufficient for their heavy information needs.

Future trends towards e-journal consortia

University librarians as well as the academics were asked for their views on the future trend of this e-journal consortium.

◆ University Librarians

The largest percentage (31.3%) of university librarians has affirmed that this great effort of e-journal consortia is essential to overcome budgetary problems of the universities regarding journal acquiring. 12.5% percentage of librarians stated that the bargaining power

is high for the e-journal databases through the consortia. 6.3% percentage of librarians has given their views as the e-journal consortia could be targeted for expensive titles. 6.3% of librarians' view was to have more awareness programs regarding this e-journal consortium as well as the online journal databases acquired through consortia to be able to get much and more benefits.

◆ University Academics

All most all the (97.63%) university academics were interested in more specific information through the consortia as online databases than present. Most of them were interested in more specific information related to their specific subject and research interests. Only a small percentage of users (2.36%) were not interested in having more specific information through online databases than present. They were senior lecturers and professors. Most of them are very much satisfied with the existing e-journal databases. These online journal databases has already been fulfilled their information needs. Also a few respondents didn't like to have more information in electronic form any more. Further academics' special views on future of these e-journal databases and the consortia effort were investigated. Their views have been categorized as follows.

Table 3 shows the largest percentage of academics (56.2%) expected to have much more subjects' related e-journal databases through consortia. The next larger percentage of users (21.9%) requested to enhance the service by increasing the download speed, user-friendly menus and frames as well as their own infrastructure facilities. While 8.76% of academics asked for improving the awareness programs regarding e-journal databases

and 8.03% requested for full text access for all databases in the future. The remaining has affirmed to have evaluations for academic requirements before purchasing e-journal databases and to try to get free access for more journals.

Table 3: Frequency table for future views on e-journal consortia

View	Count & Percentage
Purchase related database with reference to relevant subjects	77 (56.2%)
Evaluate academic requirements before purchasing databases	5 (3.65%)
Enhance the service and the infrastructure	30 (21.9%)
Full text access for all databases	11 (8.03%)
Free access for more journals	2 (1.46%)
Improve the awareness programs	12 (8.76)
N= 137	

Table4: Frequency table for future views on e-journal consortia

Most of the e-journal using academics have stated that to purchase e-journal databases specifically related to their subject and research interests. Further 9.82% users mostly prefer to have full text e-journal databases. 65.93% of users who accessed free trials or e-journal databases subscribed by the university affirmed that they need to purchase more subject related e-journal databases.

Conclusions and recommendations

Acquiring e-journal databases through consortia is a major step taken in meeting information needs of academics under a controlled budget and with other limited facilities. But the usage of electronic journal databases provided through consortia to access e-journals were low for the largest percentage of universities as observed. It was high only for a few universities and a moderate usage was reported by about 1/3 of universities.

However 90% of the university libraries have provided access to e-journals through their libraries. All of them have provided URLs of e-journal databases provided through PERI project. A larger percentage, of university libraries have no sufficient infrastructure facilities to provide access to e-journals for the users. The largest number of respondents mostly faced to the disadvantage of slow process in downloading of e-journals. All the university libraries, which provided access to e-journals, have already planned to enhance this special service in the future.

Besides many a problem the academic face in accessing e-journals, 75% of the university librarians have accepted e-journal consortia, as a strong source to fulfill the information needs of their users. But around half of the responded librarians have reported that the e-journal consortia effort is not sufficient for their heavy information needs. A largest percentage of university librarians have affirmed that this great effort of e-journal consortia is essential to overcome budgetary problems of the universities regarding journal acquisition.

All most all the users were interested in more specific information in the future through the consortia as online databases than the present. Most of them were interested in more specific information related to their specific subject and research interests.

The study clearly revealed that university academics mostly search for the very specific information, which is directly related to their subjects and research interests. Therefore the e-journal acquisition should take place by considering the academic's requirements. It was also revealed that the academics are to be provided with more infrastructure facilities to access e-resources with more privacy access.

Implication for future research

Major conclusions of the study are directed to the other research areas. One of the major conclusions drawn from this study is the neediness of more specific information related to their specific subject areas through consortia in the future. Therefore one can launch an evaluation of academics specific information needs through their e-journals interests.

Further one can study the way of e-journals accommodated to the academics' as well as librarians' in terms of budgetary allocations and adoption future separately for e-journals.

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Current status of using Information & Communication Technologies (ICT) and perceptions on future developments towards scholarly communication process of medical academics in Sri Lankan universities

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Abstract

The study was conducted to investigate the current status of using ICT and perceptions on future developments towards scholarly communication process of medical academics in Sri Lankan universities. This is accumulated with data from questionnaires supplemented by interviews with 125 medical academics in five universities. Results indicated that medical academics use World Wide Web (WWW) and e-mail most frequently for their scholarly activities and the highest percentage has given their first preference to WWW. All of them regularly use word-processing and presentation packages. Although medical academics identified ICT as a stylish facilitator of their work, it did not seem that they made optimal utilization of these technologies. Reasons found for this situation are lack of infrastructure

facilities, technical knowledge & skills, and helping staff etc. Recommendations are made to improve infrastructure facilities at the university level and to employ university librarians to some extent as IT helping staff for an enhanced utilization of facilities and finally take steps towards an e-world.

Keywords: *ICT, scholarly communication process, university academics, medical academics*

Introduction

Information & Communications Technology is a term that covers all forms of computer and communications equipment and software used to create, store, transmit, interpret, and manipulate information in its various formats. According to Laurillard (2002) these technologies can be divided as;

- ◆ Capturing technologies, with input devices that collect and convert information into digital form.e.g. keyboards, barcode readers etc.
- ◆ Storage technologies, producing a variety of devices to store and retrieve information in digital form. e.g. hard disks, floppy disks
- ◆ Processing technologies, creating the system and applications software that is required for the performance of digital ICT. e.g. Microsoft Office
- ◆ Communication technologies, producing the devices, methods and networks to transmit information in digital form. They include digital broadcasting, integrated services digital networks, digital cellular networks, Local Area Networks (LANs), Wide Area Networks (WANs, such as Internet),

Electronic Bulletin Board Systems (BBS), modems, transmission media such as fiber optics, cellular phones, fax machines and digital transmission technologies for mobile space communications (the new low Earth Orbit satellite voice and data services).

- ♦ Display technologies, which create a variety of output devices for the display of digitized information. e.g. monitors, CD-ROM drives

ICT helps unlock stores of national content, making them accessible to global, and it is a powerful tool for directing and expressing creativity. Investing in ICT can have a powerful effect on productivity in almost every institute, driving innovation, cutting costs, and opening up new opportunities. ICT help to overcome limitations of size, and enable even tiny institute to establish a global presence as well as ICT can manage resources better.

Creation, organization and dissemination of information is a fundamental aspect of an academic career. Teaching and learning is a core mission of the university academic community. Lecturing, presentations, evaluation of student performances and presence in conferences are major activities relating to teaching. Research is the key component of the university academics. Research is essentially a cerebral and a social activity. Research related scholarly activities they engaged are, publishing, and peer reviewing, and obtaining grants, participating in workshops / meetings / conferences / professional forums and providing consultations on the area of specialization.

Scholarly communication process is a technique used for sharing and exchange new knowledge among academics and researchers. For the study, scholarly communication is defined as the process

of creating, organizing, evaluating, editing or formatting, distributing, making accessible, archiving, using and transforming information or scholarly works through formal and informal channels locally and globally. As scholarly communication process becomes more and more multipart, a hidden powerful inspiration that changed working and collaborative patterns of academics came in to battle. That is Information and Communication Technologies (ICT).

The information access through digital technologies can promote innovation, increase productivity, and enrich the quality of academics. There is an international consensus on the importance of intellectual input in creating value, underlining the need for investment in education and skills in general, with a special focus on ICT skills and research and development. ICT has changed the face of modern science and technology research, requiring research organizations to be linked to each other through an Advanced Network that is connected to the rest of the world. Ready access to a safe, secure, and affordable communications infrastructure that enables national and international collaboration is the other half of the equation to take us forward to the Knowledge Society:

$$I + C = KS$$

**(I-Information, C-Communication, KS-Knowledge
Society)**

Thus, the scholarly communication process and the ICT have recognized as essential and active tools of the virtual global knowledge society.

Information and Communication Technologies (ICT) serve as the tool that fosters the knowledge society. ICT provide new and faster ways of delivering and accessing information, innovative ways of real time communication and so on. Rapid growth as well as the diffusion of ICT have a strong effect on many aspects of modern scholarly communication process and have begun to evolve a virtual global knowledge society.

The emergence of globalization of academic institutions will make the traditional Sri Lankan university boundaries obsolete. But Sri Lankan universities have a long way to go if they want to upgrade their facilities so as to assure the optimum utilization of new modes of research, teaching, learning and dissemination of knowledge through ICT.

In universities the traditional activities were being altered in modern sophisticated manner through ICT. Thus, ICT were called to attention or referred to as a major force used in Sri Lankan universities these days (Michelsen, 2005). Although ICT so far had limited impact on how the university is organized and how learning, teaching and research were conducted, a series of factors had nevertheless pointed in the direction of development where the new technologies would become more important.

Medical academic community in universities contributes for the scholarly communication process in various capacities, facilitating multidisciplinary collaboration of educational research projects and innovative scientific developments. To keep up with the scientific revolution, medical academics need; timely and reliable exchange of experimental information, access to relevant advances in knowledge, raising awareness, advocacy for progressive policies,

access to disciplinary specific data, and training and research and the local as well as international collaboration.

The current trend of the Sri Lankan university medical academic community is to adopt ICT in a high level to save their time for the convenience of their scholarly works. But, the medical academic community is being gradually left behind, in this case, with their busy life with their clinical works too.

Although there is wide range of sophisticated facilities with ICT, Sri Lankan academics use only some of them. For this particular study, computing technologies, processing technologies, communication technologies, telecommunication and the Internet represent as ICT used to communicate, process, create, disseminate, share, store and manage information.

Most of the academics in Sri Lankan universities mostly use common computer packages/ programs for their scholarly activities such as creation, processing, store, data analysis and lecture delivering. Some of them, which were selected to this study, are Word processing packages, Spreadsheet programs, Presentation packages, Page making packages, Statistical packages, Graphic designing packages, E-mail (Electronic mail), WWW (World Wide Web), EDGs (Electronic Discussion Groups), BBS (Bulletin Board System), Telnet, and Video conferencing. Further they can capture the advantage of Web 2.0 tools for their scholarly activities. "Web 2.0" refers to a perceived second generation of web development and design, that facilitates communication, secure information sharing, interoperability, and collaboration on the World Wide Web. Web 2.0 concepts have led to the development and evolution of web-based communities, hosted services, and applications such

as social-networking sites, video-sharing sites, wikis, blogs, and folksonomies. The popularity of the term Web 2.0, along with the increasing use of blogs, wikis, and social networking technologies, has led many in academia to coin a flurry of 2.0s, including Library 2.0, Social Work 2.0, Enterprise 2.0, PR 2.0, Classroom 2.0, Publishing 2.0, Medicine 2.0, and Government 2.0. Many of these 2.0s refer to Web 2.0 technologies as the source of the new version in their respective disciplines and areas.

The growing use of these ICT in scholarly communication process of university academics having a fundamental impact on the way they engage in their scholarly works. Therefore, this study in the field of Medical Science in Sri Lanka enlightens other fields and the countries in adopting as well as using ICT for their scholarly communication process.

Objectives of the study

The main objective of the study is to evaluate the current status and future trend of ICT utilization in scholarly communication process of medical academics in the universities of Sri Lanka

Specific objectives derived for the study can be given as follows;

- ◆ To determine the mostly used ICT by medical academics in their scholarly communication process.
- ◆ To ascertain the current status of the use of ICT and the perceptions on future development of ICT regarding the scholarly communication process of medical academics.

Research design

Survey method was used to conduct this research. The teaching community in the field of Medical Sciences was the 'population' for this particular study. The common characteristic of the elements was 'members of the Faculty of Medicine'. 'Stratified random sample' was used in sampling, in order to present all the categories of the population. 'University' and the 'lecturer category' were identified as the criteria for the stratification. The sample was selected to represent each strata proportionately. 25% of each strata was taken into account. The main instrument of the data collection was the questionnaire. Because of the complexity of the questions, questionnaires were supplemented by interviews. Therefore, the researcher visited all the selected universities (except Jaffna) to fill the questionnaires by interview mode. However, some of the respondents completed the questionnaires themselves. Researcher visited the universities during September-November 2005 and 100% response rate was achieved in this manner.

Questionnaires were sent to the Jaffna University in September 2005 by post. However, none of the questionnaires were returned. Due to prevailing situation in the country, it was not possible to visit the Jaffna University. Hence the University of Jaffna was dropped from the analysis of the study.

Analysis of mostly use ICT and current status of using ICT

Sample Description

Out of 131 expected questionnaires, 125 were completed at a rate of 95.42%. Except the University of Jaffna, the response rate was 100%. Therefore, the overall response rate is satisfactory.

A large percentage (25.6%) of respondents were from the University of Colombo, because of it represented the largest group of the population too. Majority of the respondents are senior lecturers. But the gender distribution is not much varied over the respondents. It categorizes as 51.2% males and 48.8% females. The most of the respondents were from the age groups 31-40 (40.8%) years and 41-50 (34.4%) years. Ages above 60 years and within 21-30 years were only small percentages 5.6% and 4.8% respectively. Only a 21.6% respondents are from Clinical departments (Clinical Medicine, Obstetrics & Gynecology, Pediatrics, Psychiatry, surgery and Anesthesiology) and the majority of respondents (78.4%) are from other clinical support departments (Anatomy, Biochemistry, Community & Family Medicine, Forensic Medicine, Microbiology, Parasitology, Pathology, Pharmacology, Physiology and Medical Education).

The respondents were asked the frequency of using a computer on average day for their academic activities. 92.8% (116) of respondents used a computer on average daily basis. 5.6% (7) used it on average weekly basis for their academic purposes. The two remaining respondents out of 125 were not using a computer. One of them is a female senior lecturer from a clinical support department with a service of nine years in the University of Peradeniya. She preferred not to have anything to do with computers and she did not use e-mail. However, the assistants have done some documentation with a computer occasionally instead of her. The other one is a senior professor of the University

of Sri J'Pura. He does not use a computer by himself. But, the assistants have done the computer activities for him. Therefore, he fulfilled some of scholarly activities such as preparing lecture notes, presentations and documentation through computers. Majority of the respondents, 64.8% used a computer with Internet access at both university and home. 16% of respondents used it only at their universities. The majority (55.2%) of respondents used their personal e-mail address and 36.8% use the e-mail addresses both personal and given by university for their academic and personal activities.

♦ Analysis of ICT usage

The rank of mostly used ICT was examined separately for the electronic communication technologies and computer packages. First, respondents were asked to rank the mostly use order of electronic communication technologies. Results were as Table 1.

Table 1 Percentages according to preference order of electronic communication technologies

Choice	1st	2nd	3rd	4th	Total
Electronic communication technology					
Electronic mail	33 (27.50)	33 (69.17)	3 (2.50)	1 (0.83)	N=120
World Wide Web	90 (74.39)	31 (25.62)	-	-	N=121
Electronic Discussion Groups	1 (4.17)	3 (12.50)	15 (62.50)	5 (20.83)	N=24
Bulletin Board Systems	-	1 (11.11)	8 (88.89)	-	N=9

Table 1 shows that a majority of the respondents used WWW and e-mail. Only 24 respondents used EDGs and nine used BBSs. As

highlighted in the table, the largest number of respondents 90 (74.38%) have given their first choice for the WWW. Thus, the mostly used electronic communication technology is WWW. Respondents accessed online journals, other medical free resources and websites through WWW. The next largest number of respondents, 83 (69.17%) have offered their second choice for e-mail. Only 33 (27.50%) have given their first choice for e-mails.

Friedman test was employed to see the difference between choices of using above-discussed electronic communication technologies under an adjustment. Since all the respondents have not used the desired entire electronic communication technologies, the least rank was replaced as the missing values in order to have similar number of responses. The testing hypothesis was:

H_0 : there is no difference among ranks versus H_1 : there is any difference among ranks

Table 2 Friedman test results for the significance of using order of electronic communication technologies

Friedman Test Results

$\chi^2 = 283.51$ DF = 3 P = 0.000
 $\chi^2 = 313.27$ DF = 3 P = 0.000
 (adjusted for ties)

Treatment	N	Est Median	Sum of Ranks
E-mail	120	2.000	213.5
WWW	120	1.000	152.5
EDG	120	4.000	410.5
EB3	120	4.000	423.5

Grand median = 2.750

The p-value for the test was very small (0.000) and it was less than 0.05. Therefore, the H_0 of the hypothesis was rejected. It implies the existence of significance treatment effect. Estimated medians revealed that the difference exists between the choices for e-mail use and the WWW use. Table 2 further confirms that the largest number of respondents mostly use WWW other than other electronic communication technologies.

Table 3 Percentages according to using order of computer packages

Computer packages \ Choice	1st	2nd	3rd	4th	5th	6th	Total
Word Processing packages	63 (52.07)	57 (47.11)	1 (0.83)	-	-	-	N=121
Presentation packages	76 (62.30)	46 (37.70)	-	-	-	-	N=122
Spreadsheets	1 (1.10)	11 (12.09)	67 (73.63)	11 (12.09)	1 (1.10)	-	N=91
Page making packages	-	2 (23.08)	5 (38.46)	4 (30.77)	1 (7.69)	-	N=13
Statistical packages	-	4 (5.88)	21 (30.88)	34 (50.00)	9 (13.24)	-	N=68
Graphic design packages	-	3 (15.79)	8 (42.11)	5 (26.32)	2 (10.53)	1 (5.26)	N=19

Table 3 highlights that the majority of respondents mostly used word-processing packages and presentation packages. Ninety-one used spreadsheets, 68 used statistical packages, 19 used graphic design packages and 13 used page-making packages. There were only two respondents who used the all computer packages mentioned.

According to table 3, the largest number of respondents 76 (62.30%) have given their first choice for the presentation packages. With the emergence of novel technologies, academics Figure shows

mostly use the presentation packages with multimedia projectors in delivering lectures as well as for teaching. In addition, when it was required to provide lecture notes for the students, they used the presentation package to prepare it and for making the handout. Therefore, their usage of presentation packages has become very high. Because of those reasons, the majority's first choice goes for the presentation packages.

Table 3 further shows that 63 (52.07%) out of 121, have offered their first choice for word-processing packages. Most of the time respondents use it for preparing articles/ abstracts and any other documents. Sixty-seven (73.63%) out of 91, thirdly used spreadsheets for their scholarly activities.

Data were statistically analyzed to test the hypothesis;

H_0 : there is no difference among ranks H_1 : there is any difference among ranks

The results for the using order of computer packages were presented in Table 4.

Table 4 Friedman test results for the significance of order of using computer packages

<u>Friedman Test Results</u>			
S = 442.29 DF = 5 P = 0.000			
S = 509.05 DF = 5 P = 0.000 (adjusted for ties)			
			Sum
Treatment	N	Est. Median	Ranks
Spreadsheets	122	3.167	445.5
Graphic design	122	4.000	587.0
Page making	122	4.000	589.0
Presentation	122	1.333	178.5
Statistical	122	3.833	569.0
Word processing	122	1.667	193.0
Grand median = 3.000			

According to the p-value of the Friedman test, depicted in Table 4 the null hypothesis could be rejected. It implies that there exists a significance difference of using order of computer packages. Estimated medians of the table clearly show that the differences are available among the choices of using all the other computer packages except for graphic design packages and page making packages. The rank sums of Friedman test shown in Table 4, confirms the largest number of respondents mostly use presentation packages and then word processing packages.

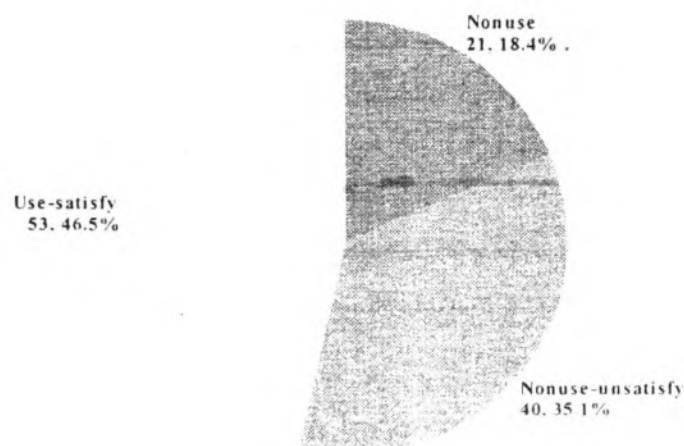
- ♦ Current status of using ICT

An open ended question was provided to respondents to make notes on their current status of using ICT for their scholarly activities. According to comments given, respondents were first categorized into three groups;

- ♦ Respondents who gave positive comments on usage of ICT
- ♦ Respondents who gave negative comments on usage of ICT
- ♦ Respondents who gave both-ideas on usage of ICT

Distribution of these three groups was depicted in Figure 1.

Current status of using ICTs for scholarly communication process



that 46.5% of respondents have given positive comments on their usage of ICT. The positive comments they have given are; ICT provides a very useful teaching/ learning/ research resources & service, ICT facilitates user's electronic communication services too, ICT makes academic work easier, effective and saves the time. Because of these reasons, they used ICT much and they were satisfactory with it.

The other fraction of the respondents were also used ICT to some extent, but they have not used as they wished and according to their requirements. However, they were not satisfied on their usage. Out of them, 35.1% of respondents have given only negative comments. The negative comments they have given are; Lack of infrastructure facilities, Lack of technical knowledge, skills and ability, Lack of reliable resources, Lack of time to use, and Dislike to use. The rest of 18.4% has given both positive and negative comments, but they also have not used ICT as they wished.

The comments, which respondents have been given, were further analyzed in detail as shown in Table 5.

According to the above table 5, the majority of the respondents have given the positive comments. Among them, the largest number of respondents (72) has given the comment as 'ICT provide a very useful teaching/ learning/ research resources and services'. That number mostly comprises of senior grade lecturers 38(52.78%) and the rest includes 12(16.67%) professors and 22(30.56%) lecturers. Fifty-one (51) has affirmed that ICT facilitates user's electronic communication services. It consists of 26(50.98%) senior lecturers, 19 (37.25%) lecturers and 6(11.76%) professors. Forty-four (44) respondents commented as 'ICT makes academic

work easier, effective and saves their time'. Out of them, half were senior grade lecturers. Others were 12 (27.27%) lecturers and 10(22.73%) professors. Finally, they noted that because of those positive remarks of ICT, they used ICT mostly for their scholarly purposes as well as others and further they were satisfied on their usage.

Table 5 Frequencies of respondents who have given comments on current usage of ICT

Comments		Prof	ŞırLec	Lec	Total
Positive	ICT provides a very useful teaching/ learning/ research resources & services	12 (16.67)	38 (52.78)	22 (30.56)	72 (100)
	ICT facilitates users electronic communication services	6 (11.76)	26 (50.98)	19 (37.25)	51 (100)
	ICT makes academic work easier, effective and save the time	10 (22.73)	22 (50.00)	12 (27.27)	44 (100)
Total					167
Negative	Lack of infrastructure facilities	10 (25.00)	19 (47.50)	11 (27.50)	40 (100)
	Lack of technical knowledge, skills and ability	3 (33.33)	4 (44.44)	2 (22.22)	9 (100)
	Lack of reliable resources	-	5 (50.00)	5 (50.00)	10 (100)
	Lack of time to use	3 (23.08)	8 (61.54)	2 (15.38)	13 (100)
	Not like to use	-	2 (50.00)	1 (25.00)	3 (100)
Total					75

Seventy-five (75) of respondents have given negative comments towards ICT for scholarly communication process as shown in Table 5. The largest number of respondents (40) among them remarked that the lack of infrastructure facilities has become a major reason for not using ICT for scholarly activities as they wished and required. That number comprises mostly of senior

10(25.00%) professors. Then thirteen responded, as they have no time to use ICT for scholarly purposes, ten have noted that they not inclined to use much due to lack of reliable resources and nine responded that they did not have adequate technical knowledge, skills and ability on ICT. Because of these reasons, all of them did not use much and were unsatisfied with their usage.

Three respondents including two senior lecturers and one lecturer were stated that they do not like to use ICT as highlighted in the table. Those have only given that comment, but they used ICT to some extent for their scholarly activities.

As shown in Figure 1, 21 (18.4%) respondents have produced both positive and negative comments. All of them noted that although ICT has much more benefits and good characteristics they have not been able to use them due to lack of infrastructure facilities, lack of time, lack of necessary technical knowledge and lack of necessary resources. More than half of those respondents 12 (57.14%), remarked that the unavailability of adequate infrastructure facilities as the reason for not using ICT for scholarly purposes according to their wish and necessity as well as they were unsatisfactory on the facilities available for them.

- ◆ Perceptions on future development of ICT

Respondents were asked about the perceptions on future development of ICT on scholarly communication process in their universities through an open-ended question. Only 101 were commented on future development of ICT towards scholarly purposes. The given comments were summarized as shown in Table 6.

Table 6 Frequencies of respondents who have given comments on future development of ICT

Comments	Prof	Sen Lects	Lec	Total
<i>Need more infrastructure facilities with a better Internet connection</i>	8 (17.39)	23 (50.00)	15 (32.61)	46
Should be developed as e/virtual universities and finally an e-world	6 (17.14)	20 (57.14)	9 (25.71)	35
Need to subscribe more e-resources/ services	2 (7.69)	15 (57.69)	9 (34.62)	26
Need to establish computer based teaching, exams and problem based learning through computers	3 (23.08)	6 (46.15)	4 (30.77)	13
Need to develop an inter-university network	1 (14.29)	5 (71.43)	1 (14.29)	7
Need more sophisticated equipments and s/w	1 (20.00)	1 (20.00)	3 (60.00)	5
Need much knowledge and skills on ICT	1 (20.00)	2 (40.00)	2 (40.00)	5
Need a helping staff for using ICT	1 (25.00)	3 (75.00)	-	4
Should be facilitated students	-	-	3 (100)	3

Table 6 highlights that the largest number of respondents (46) comprising of 23(50.00%) senior lecturers, 15(32.61%) lecturers and 8(17.39%) professors, noted that they need to develop infrastructure facilities. According to the interview survey, they wished to have more computers, network connections as well as reliable & continuous Internet connections for their departments. Thirty-five (35) commented that they wish major developments of ICT in their universities to if possible become e-universities/ virtual-universities and finally to an e-world. That comprised mostly of senior lecturers 20(57.14%) and then 9(25.71%) lecturers and 6(17.14%) professors.

Further, 26 academics responded that they need more e-resources such as related online journals, online databases and e-services such as telnet, Electronic Discussion Groups (EDG) as well as video conferencing/ teleconferencing facilities. Most of them (18) were willing to have more e-resources. Only one junior lecturer remarked that he need telnet and EDG facilities to get easily perform his academic activities. The rest of respondents affirmed of the necessity of video conferencing/ teleconferencing facilities. Most of them were from Forensic Medicine Departments. One senior lecturer from Forensic Medicine Department in the University of Ruhuna said that, *"Most of the time I have to travel long distances for postmortems. Therefore if videoconferencing facilities are available, I will be able to perform them from here and save my time"*. Others were from Anatomy Departments.

Thirteen (13) respondents emphasized on the destitute of computer based teaching learning environments and online exams and seven (7) highlighted that the necessity of an inter-university network. At the interview survey, five (5) respondents made an interesting comment. They showed the necessity of more sophisticated equipments to increase the usage of ICT in scholarly communication process. One professor noted that, *"If the department has a portable hand held multimedia projector, then I will be able to bring it to the lecture hall by myself and deliver all of my lectures as PowerPoint presentations"*. At the same time, he showed the necessity for much skills and knowledge on ICT.

Four respondents including one professor commented on the urgency essential of helping staff to help with their high usage of

ICT on scholarly activities. Lastly, three lecturers produced an idea to facilitate students with all these developments regarding ICT in the university system.

Conclusion

According to the survey medical academics mostly use WWW and e-mail most frequently for their scholarly activities. However, the highest percentage of lecturers (75%) gives their first choice to the WWW.

All the medical academics regularly use word-processing packages and presentation packages. 62% of academics give their first choice to the presentation packages and 52% for the word processing packages.

Current status and future perceptions of ICT on scholarly purposes

Nearly fifty percent of the medical academics have a positive attitude towards ICT and use ICT satisfactory. They believe that ICT provides very useful teaching/ learning/ research resources & services; ICT facilitates electronic communication of the users and help in academic work-making it effective and time saving. Largest number of academics (72) commented that 'ICT provide very useful teaching/ learning/ research resources and services'.

Some medical academics do not use ICT comfortably. They are not satisfied in the way they use ICT. Reasons for low and unsatisfactory use of ICT are the lack of infrastructure facilities, inadequate technical knowledge/ skills, non-availability of reliable

resources and lack of time to use. Forty (40) lecturers affirmed that lack of infrastructure facilities had become a major reason for not using ICT for scholarly activities.

Some medical academics have positive attitude towards ICT, but they are unable to use ICT as they wish and when necessity arises since their departments lack infrastructure facilities. The situation may be due to inadequate funds and unawareness.

Medical academics wish to have more developed infrastructure facilities with improved and continuous Internet facility. In addition, they expect to have more e-resources, more sophisticated equipments, trainings and guidance in using ICT.

Recommendations

The academics find the ICT facilities provided by the universities are not up to standard. Hence, it is recommended to expand and enhance ICT facilities particularly by providing more enhanced Internet connections.

Medical professionals have realized necessity of improving their ICT skills particularly in Internet searching. It is recommend to provide them with more training facilities. University libraries are the focal points regarding this position. They can organize ICT training as part of their user education programs. Library staff is more accessible and approachable to Medical academics as well as they will become effective instructors too. Therefore library staff should be trained to take full advantage of the opportunities of ICT, need to develop the skills of workforce at every level, from front-line staff to senior staff.

Therefore, researchers can conduct studies to investigate the new steps librarians have set out within their roles towards academia in enhancing their adoption and utilization of novel technologies.

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ඉපැරණි සංකේත ආශ්‍රයෙන් ගොඩනැගිය හැකි ශ්‍රී ලංකාවේ ආදි සන්නිවේදන සම්බන්ධතා අශෝකා ශ්‍රියාණි සිරිවර්ධන

හැඳින්වීම

මෙතෙක් සිදුකර ඇති මානව අධ්‍යයනයන්ට අනුව දැනට වසර මිලියන 2.5 කට පූර්වයෙහිදී මානවයාගේ සම්භවය සිදුවී තිබෙන බව හඳුනා ගෙන තිබේ. විවිධ පරිසර කලාප හා භූ කලාප වල අනාදිමත් කාලයක සිට මානවයා පදිංචි වී සිටි බව අප්‍රිකාව, යුරෝපය, ආසියාව ආදී මහද්වීප තුළින් හඳුනාගෙන ඇත. මානව සම්භවයේ ඉතිහාසය අධ්‍යයනයේ දී එහි ප්‍රාරම්භක අවධිය හඳුන්වන ලබන්නේ ප්‍රාග් ඓතිහාසික අවධිය වශයෙනි. මෙම අවධිය ප්‍රධාන අනු යුග කිහිපයක් ඔස්සේ වර්ධනය වී ඇතිබව හඳුනාගෙන තිබීම ද වැදගත් වේ. එම අනු යුග අතර පුරාශිලා යුගය (Palaeolithic), මධ්‍යශිලා යුගය (Mesolithic), නවශිලා යුගය (Neolithic) ප්‍රධාන වේ.

මෙම යුග තුන තුළින් ප්‍රාග් ඉතිහාසයේ මූලාරම්භ අවධිය වන්නේ පුරාශිලා අවධියයි. අවුරුදු ලක්ෂ ගණනාවක් තුළ වර්ධන වී විකාශනය වන පුරාශිලා යුගය ප්‍රධාන වශයෙන් තවත් උප යුග

තුනක් ඔස්සේ වර්ධනය වී ඇති බව පුරාවිද්‍යාඥයින් හා මානව විද්‍යාඥයින් පෙන්වා දී ඇත. ඒවා මෙසේ බෙදා වෙන්කර ඇත. පහළ පුරාශිලා යුගය (Lower Palaeolithic), මධ්‍ය පුරා ශිලා යුගය (Middle Palaeolithic), ඉහළ පුරා ශිලා යුගය (Upper Palaeolithic). (Deraniyagala: 1992).

ශිලා යුගයේ ප්‍රධාන අනු යුග තුන වන පුරාශිලා, මධ්‍යශිලා, නවශිලා යන යුග වර්ග කිරීමට ලක් කොට ඇත්තේ ඒ ඒ යුග ඇසුරින් වර්ධනය වන්නා වූ තාක්ෂණය, සම්පත් පරිහරණය ජීවනෝපාය හා ජනාවාස රටාව තුළ පවතින්නා වූ සුවිශේෂ අනන්‍යතා සැලකිල්ලට ගෙන ය. විශේෂයෙන් ම ප්‍රාග් මානවයා වඩා ප්‍රාථමික අවධියේ සිට ක්‍රමානුකූලව තම සංස්කෘතිය හා තාක්ෂණය ඔස්සේ වර්ධනය කර ගැනීම පිළිබඳ සාධක විශාල ප්‍රමාණයක් තිබෙන අතර එයින් සන්නිවේදනය සඳහා භාවිත කළ ක්‍රමවේදය ඉතාම වැදගත් වේ. ලෝක පරිමාන වශයෙන් ක්‍රිපූ.8000 - 5000 අතර කාලය සන්නිවේදනය සම්බන්ධව ඉතිහාසය තුළ මානව ක්‍රියාකාරීත්වයේ ලේඛනය, භාෂණය, චිත්‍රනය, ප්‍රකාශනය සම්බන්ධ විජලවීය පරිවර්තනයක් වූ වකවානුව වශයෙන් හැඳින්වූ හැක (බ්‍රිතරගම: 2008) නියොලිතික කාලවකවානුව වන විට ස්පාඤ්ඤය, ප්‍රංශය, සිසිලිය, ඔස්ට්‍රියාව, ඉතාලිය වැනි රටවල ප්‍රාග් ඓතිහාසික කලාවේ වර්ධනය සන්නිවේදනය සම්බන්ධ වඩා වැදගත් කරුණු සපයයි. ඇල්ටමීරා, ලැස්කෝ, කෝගුල්, සහ ලා - මැන්ඩලෙයින් වැනි ගුහා තුළින් මානවයා සත්වරූප සිතුවම් කිරීමෙන් තම සන්නිවේදනය ආරම්භ කර ඇත (එම). එහි දියුණු අවස්ථාවන් අපට ලෝක මට්ටමින් දැකිය හැක්කේ දූනට වසර 6000 කට පෙර විශ්මය දනවන පිරමීඩ තැනීමේ ප්‍රමුඛයන් වූ ඊජිප්තු වැසියන් සිය දෙවිමැදුරුවල තබා ඇති “ශුද්ධ ලේඛන” එනම් හයිරොග්ලිපිකස් (Hyrogliphics) මඟිනි. සත්වරූප අනුසාරයෙන් එහිදී ප්‍රකාශ කර ඇත්තේ යම් කිසි අදහසකි,

තොරතුරක්, සන්නිවේදනයකි. මෙය රූපකෂර කලාව වශයෙන් හඳුන්වනු ලැබේ (පීරිස්: 2002). එසේම මෙසපොතේමියාවේ යුප්‍රටීස් ටයිග්‍රීස් ගංගා මධ්‍යයේ වර්ධනය වූ දැනට අවුරුදු 8000 කට වඩා පැරණි මෙසපොටේමියානු මැටි පුවරු මත ලියූ සංකේත අක්ෂර ක්‍රමයක් හඳුනාගෙන ඇත. මේවා කැක්කේෂාකෂර වශයෙන් හඳුන්වා තිබේ (බ්‍රිතරගම: 2008). එසේ ම චීනයේ හොවුංහෝ ගංගා මිටියාවෙන් වර්ධනය වූ ශිෂ්ටාචාරයේ ද ක්‍රි. පූ. 1750 කට පෙර කාලයේ දී ඇටකටු හා කැස්බෑ ලෙලිවල සටහන් කෙරෙනු විනාකෂර ක්‍රමයන් සොයාගෙන ඇත. මෙම තත්වය දකුණු ආසියාව තුළින් හඳුනාගත හැක්කේ මොහෙන්දජාරෝ හරප්පා ශිෂ්ටාචාර තුළිනි. අදින් වසර 3000 කට පෙර පිලිස්සු මැටි පුවරුවල රූප හා සංකේත අක්ෂර කලාවක් සන්නිවේදන හෝ ප්‍රකාශන මාධ්‍යයක් වශයෙන් ඉන්දු නිම්න වාසීන් භාවිතා කර ඇති බව ජෝන් මාර්ෂල්, මැකේ, මජුම්දාර් යනාදීන් විසින් සිදුකරනු ලැබූ පුරාවිද්‍යා කැනීම් මගින් තහවුරු කොට තිබේ (Buhler : 1962).

ශ්‍රී ලංකාවේ සන්නිවේදනයේ හා ප්‍රකාශනයේ සමාරම්භය

ලෝක සන්නිවේදන ඉතිහාසයේ තතු එසේ තිබිය දී ආදි ශ්‍රී ලංකාවේ සන්නිවේදන මාධ්‍ය පිලිබඳව විමසීමේ දී වඩාත් සරල ආකාරයට එහි වර්ධනය අපට හඳුනාගත හැක්කේ ප්‍රාග් ඓතිහාසික අවධියෙනි. ශ්‍රී ලංකාවේ මෙතෙක් සිදුකොට ඇති පුරාවිද්‍යා පර්යේෂණවලට අනුව ලංකාවේ ආදිතම ප්‍රාග් ඓතිහාසික දත්ත වාර්තාවන්නේ මධ්‍යපුරා ශිලා යුගය (Middle Palaeolithic) තුළිනි. බුන්දල, පතිරාජවෙල, උස්සන්ගොඩ, මිනිහාගල්කන්ද ආදී ප්‍රදේශවල සිදුකරනු ලැබූ කැනීම්වල දී මෙම අවධියට සම්බන්ධ මානව කෘතක සාධක (Stone Implement) හඳුනාගැනීමට හැකිවී තිබෙන අතර විකිරණමාන දින නියම කිරීම්වලට අනුව ඒවා අදින් වසර 74000 - 125000 අතර කාලයට අයත් බව හඳුනාගෙන ඇත

(Deraniyagala: 1992; 2004). භූගෝලීය වශයෙන් සර්මකලාපීය දේශගුණය හේතුවෙන් මෙම කාල වකවානුවේ ජීවත් වූ මානවයා සම්බන්ධ සැකිලි සාධක හෝ ඔහුගේ ජීවනෝපාය හා සංස්කෘතික කටයුතු සම්බන්ධව පැවැති තත්වයන් විනාශ වී ඇති බව පෙන්වා දෙන දූරණියගල ලංකාවේ වඩා නිශ්චිත ලෙස ප්‍රාග් ඓතිහාසික සංස්කෘතික තොරතුරු හඳුනාගත හැක්කේ මධ්‍යශිලා අවධියෙන් බව තවදුරටත් පෙන්වා දෙයි. ලංකාවේ මෙසොලිතික සංස්කෘතිය එසේත් නැතහොත් බලංගොඩ සංස්කෘතික සමයේ විසූ මිනිසුන් සන්නිවේදනය සම්බන්ධ ක්‍රියාදාමයන් දැන සිටි බවට විශ්වාස කල හැකි සාක්ෂි විශාල ප්‍රමාණයක් ලැබෙන අවධිය වේ. වියළි කලාපයේ හා තෙත් කලාපයේ සමහර ගල්-ගෙවල් වල සිදුකරනු ලැබූ පර්යේෂණ වලින් තහවුරු කර තිබෙනුයේ අදින් වසර 40000 කට පෙර සිට ඇරඹී මෙම සංස්කෘතියේ විසූ මානවයා, හෙමටයිට්, (Hematite) ලිමොනයිට්, (Limonite) මොලිවිඩෙනම් (Molivedenum) නිල්මැටි හා පිගන් මැටි භාවිතා කර තිබේ. (සෙනෙවිරත්න : 1996). බුලත්සිංහල ෆාහියන් ලෙනෙන් හමුවූ ගුරුගල් (Red Ocher) ආලේපිත මානව හිස්කබල් කොටස් හා රාවනාඇල්ල ගල්ගේ තුලින් හමු වූ ගුරුගල් ආලේපිත සැකිලි කොටස් මේ තත්ත්වය සනාථ කරන අතර මේවා අනිවාර්යෙන් ම තම සන්නිවේදන හා ප්‍රකාශන මාධ්‍ය වන විත්‍ර හෝ කුරුටු සලකුනු ආදියේ දී භාවිත කරන්නට ඇතැයි අපට උපකල්පනය කල හැකි ය.

ශ්‍රී ලංකාවේ ප්‍රාග් ඓතිහාසික සිතුවම්

ප්‍රාථමික සංස්කෘතික අවධියක ජීවත් වූ මධ්‍ය ශිලා මානවයා තම ජීවිතාන්තය සඳහා සත්ත්ව දඩයම සිදු කිරීමේ දී ඔහුගේ දඩයම් ගොනුවේ මොනරා, මුව, ගෝනා, වලිපැදුරු, කබල්ලෑ, ඉබ්, කටුසු පිඹුරන් මෙන්ම පක්ෂි හා උරග වර්ග ද ආහාරයට ගත්බව සාධක හමුවී තිබේ (Deraniyagala: 1992). ශ්‍රී ලංකාවේ ස්වභාවික

ගල්ගෙවල්වල ප්‍රාථමික මානවයා අදින්නට ඇතැයි ප්‍රබල ලෙස සැක කරන රූ සටහන් අතර සත්වරූප, මිනිස් රූප, ඔහු භාවිත විවිධ ආයුධ වර්ග චිත්‍රවල දැකගත හැක. ප්‍රංශයේ, සිසිලිය, ඔස්ට්‍රියාව, ඕස්ට්‍රේලියාව වැනි රටවල දැකගත හැකි ඇල්ටමීරා, ලැස්කෝ, ගුල් සහ ලා මැන්ඩලෙයින් ගුහා තුළද ක්‍රි. පූ. 20000 - 12000 අතර කාලයට අයත් චිත්‍ර අතර බයිසන් ගවයින්, පිණිමුවන්, මැබන් අලින්, ඒඵවන්, වල් අශ්වයින් වෘකයන් හා රෙරනෝසිරස් යන සතුන්ගේ රූ සටහන් තිබේ (Bandaranayake: 1986).



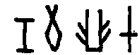





යේනක බණ්ඩාරනායක පෙන්වා දෙන ආකාරයට ප්‍රාථමික මානවයා දඩයම්කරන සතුන් ගල් ගුහාවල වැඩි වශයෙන් ඇදීමෙන් අදහස් කරන්නට ඇත්තේ සතුන්ගේ රූ නිතර තම නෙත ගැනීමෙන් එම සතුන් දඩයම සඳහා වැඩි වශයෙන් ලැබෙතැයි විශ්වාසය මත බව පැහැදිලිකර ඇත. මෙවැනි අදහස් ප්‍රකාශකරන්නට ඇතැයි හැඟෙන්නේ ප්‍රාග් ඓතිහාසික කැනීම් තුළින් හමුවන සත්ව අකෂර අතර අලියාගේ සිට ලොකු කුඩා සතුන් බොහෝ ප්‍රමාණයන් ආහාරයට ගත් බවට සාධක ලැබෙන බැවිනි. චිත්‍ර කලාව පිළිබඳව මූලික අදහස් ශ්‍රී ලංකාවේ මධ්‍ය ශිලා මානවයා දැන සිටි බවට ලැබෙන හොඳම නිදර්ශනය වන්නේ පාහියන් ගල් ගුහාව තුළින් හමුවූ මිනිස් හිස් කබල ගුරුගල් අඹරා ලබාගත් වර්ණවලින් ආලේප කිරීමත්, රාවණා ඇල්ලෙන් හමුවූ තවත් මානව සැකිලි කොටස් ගුරුගල් ආලේප කොට වර්ණ ගන්වා තිබීමය (Deraniyagala: 1992). මෙම සායම් කිරීම මානවයාගේ කලා සිතුවිලි දක්වා පරිවර්තනය වන්නට ඇතැයි උපකල්පනය කල හැකි අතර ප්‍රාග් ඓතිහාසික මානව ජනාවාස වලින් ලැබෙන ඇඹරුම් ගල් තුළින් මිනිරන් හා හුණු වර්ණ ඇඹරූ බවට සාධක ලැබීම එය තවත් සනාථ කරන්නක් වේ.

ඇටකටුවල වර්ණාලේපිත කිරීමෙන් ආරම්භ වූ ඔවුනගේ කලා ඉතිහාසය සමග ක්‍රමානුකූලව සන්නිවේදන මාධ්‍යයන් දක්වා සංකේතානුසාරයෙන් හා කුරැටු වික්‍ර මගින් ඉදිරිපත් කිරීම සම්බන්ධ සාධක මඩවල ලෙන, ගල්ඔය, සියඔලාආණ්ඩුව, තන්තිරිමලේ, රාවනාඇල්ල, ගොනාගොල්ල, බුදුගල්ගේ, කොනන්තේගොඩ, ගනේගම, ආටිගල්ගේ, බිල්ලෑව, දොරවක් කන්ද, බුදුගල, දිඹුලාගල, ලේනව, මන්ඩාගලගේ, පිලිලේගොඩ ගල්ගේ, කදුරුපොකුන, බඹරගත්තලාව, ගනේගම, දිවුගල්ගේ, ආටියාගල, කුඩුම්බිගල, මලයාඩිකන්ද, උස්සාගල ආදී ස්ථාන වලින් දැකගත හැක (Bandaranayake : 1986; Nandadewa: 1986; Deraniyagala : 1958; බිනරගම : 2008). මෙම ස්ථානයන් හි හමුවන වික්‍ර හා කුරැටු සංකේත ප්‍රාග් ඓතිහාසික අවධිය නියෝජනය කරන නිශ්චිත වික්‍ර දැයි විඳිවතුන් අතර මතවාද කිහිපයක් පවතී. සේනක බණ්ඩාරනායක මේවා ප්‍රාග් ඓතිහාසික ඝනයේ වික්‍ර වශයෙන් සැලකීම යෝග්‍ය යැයි පවසා ඇත (Bandaranayake: 1986). තන්දදේව විජේසේකර මේවා පසු කාලයේ කලාවට නැකම් නොකියන බව ප්‍රකාශ කරයි. සිරාන් දුරණියගල ප්‍රාග් ඓතිහාසික වික්‍ර ක්‍රමයක් ලංකාවේ නොපැවැති බව ප්‍රකාශ කරයි (Deraniyagala : 1986). මේ ආකාරයට නිශ්චිත කාලවකවානුවන් පිළිබඳව සාධක අපට ප්‍රාග් ඓතිහාසික සන්නිවේදනය ඇසුරෙන් ගොඩනැඟිය නොහැකි වුවත් ප්‍රාග් ඓතිහාසික ගුහා තුල හා ඉන්පසුව ඇතිවෙන යුග තුල වන සන්නිවේදනය සඳහා භාවිත කර ඇති සංකේත වල සාමාන්‍යතාවය ඔස්සේ ප්‍රකාශන මාධ්‍යයක් ලෙස සංකේත පරිණාමය වී ඇති බව හඳුනා ගැනීමට අවකාශ සැලසේ.

මේ අන්දමට ප්‍රාග් ඓතිහාසික අවධියට අයත් ගුහාවල අපට දැකගත හැකි සංකේත හා මානව සටහන් අතර පහත සඳහන් වන්නා වූ සංකේත ඉතා වැදගත් වේ. මෙම සංකේත වල හැඩ ලක්ෂණ එහි සමානතාවන් පසු කාලය දක්වා ම ව්‍යාප්ත වී තිබීම

ප්‍රාග් ඓතිහාසික යුගයේ සිට අඛණ්ඩව සන්නිවේදනයන් සංකේත මගින් පිළිඹිබු වූ බවට සාක්ෂි සපයයි. තවද මෙම චිත්‍ර අක්ෂර හෝ කුරැටු අක්ෂර කලාව පසුකාලීනව සන්නිවේදන ඉතිහාසයේ ආරම්භය ශ්‍රී ලංකාවේ ඇතිවීමට ද බලපාන්නට ඇතැයි උපකල්පනය කළ හැක.

ප්‍රාග් ඓතිහාසික අවධියට සම්බන්ධ අක්ෂර නොවන සන්නිවේදන සංකේත

තන්තිරිමලේ	
බුදුගල්ගේ	
ගොනාගොල්ල	
කොනන්ගේගොඩ	
තන්තිරිමලේ	
බුදුගල	
ආඩියාගල	
උස්සාගල	

(Seneviratne:1984;Nandadewa:1986).

ශ්‍රී ලංකාවේ තොරතුරු සන්නිවේදනයේ අඛණ්ඩ පරිවර්තනය පිළිඹිබුවන මූලඓතිහාසික අවධිය

ශ්‍රී ලංකාවේ ක්‍රියාත්මක වූ මැදගිලා (බලංගොඩ) සංස්කෘතියට පසුව මෙරට මුල්බැස ගනු ලබන සංස්කෘතිය වන්නේ මූල ඓතිහාසික සංස්කෘතියයි. (Proto Historic) ක්‍රි. පූ. 1000 - 300 අතර කාලයේ මෙරට මුල්බැස ගනු ලබන මෙම සංස්කෘතිය එතෙක් ශ්‍රී ලංකාවේ ක්‍රියාත්මකව තිබූ ප්‍රාග් ඓතිහාසික සංස්කෘතියේ

කැපී පෙනෙන ලෙස වෙනස් වේ. බලංගොඩ සංස්කෘතිය අවශ්‍යයෙන් ම ක්‍රියාත්මක වූයේ එලවැල නෙලීම, සත්ව දඩයම මුල්කොටගත් ආර්ථිකයක් තුළය. එහි ජීවත් වූ මානවයාගේ මුළු ජීවනක්‍රමයම එනම් ජීවිතයේ ගම්‍යතාවය, විරස්තායිකරණය යන සියල්ල තීරණය කරනු ලැබුවේ ස්වභාවික පරිසරය මතය. නමුත් ඉන් අනතුරුව මෙරට කලඑළි බහින ප්‍රොටෝ ඓතිහාසික මනුෂ්‍යයා පරිසරය මත යැපීම වෙනුවට පරිසරය මෙල්ල කරමින් බහු සම්පත් යැපුම් රටාවක් ක්‍රියාත්මක කිරීම සඳහා යකඩ තාක්‍ෂණය භාවිත කිරීම කැපී පෙනේ. ලංකාවේ මූල ඓතිහාසික සංස්කෘතිය තුළ දැකගත හැකි සුවිශේෂ ලක්‍ෂණ ලෙස, තඹ යකඩ ඇතුළු අවශේෂ ලෝහ භාවිතය, වී ගොවිතැන, සත්ව ගෘහකරණය, ගැමි ජනපද ක්‍රියාත්මක කිරීම, නිම් පබළු නිෂ්පාදනය, කිළුමැටි බිඳුන් රතු මැටි බිඳුන් හා කාලරක්ත වර්ණ මැටි බිඳුන් පිගන් මැටි කර්මාන්තය පවත්වාගෙන යාම පිලිස්සීමෙන් පසු මැටි බිඳුන්වල කුරුටු සංකේත යෙදීම, ජල කළමනාකරණය ශාක හා සත්ව ගෘහකරණය පෙන්වා දිය හැක. මෙම සංස්කෘතිය ශ්‍රී ලංකාවේ උතුර, උතුරුමැද, වයඹ, උතුරු මලය රට, අග්නිදිග, නැගෙනහිර හා බටහිර ශ්‍රී ලංකාවේ ක්‍රියාත්මක වීම කැපී පෙනේ. ක්‍රි.පූ.1200 දී පමණ දකුණු ඉංදියාවේ වර්ධනය වන මූල ඓතිහාසික යකඩ යුගයේ සංස්කෘතිය ක්‍රි. පූ.1000 දී පමණ මෙරට සංක්‍රමනය වීම කැපී පෙනේ (Ragan:1990).

මූලිකව වියළි තැනිතලා ප්‍රදේශ වල වාසභූමි ඇතිකර ගන්නා ප්‍රෝටෝ ඓතිහාසික ප්‍රජාව ජනරේඛයේ ප්‍රසාරනය, සමාජ ආයෝජනය වර්ධනය වීම සමග වියළි තැනිතලා භූමිවලින් ප්‍රසාරනය වෙමින් ලංකාව පුරාම ව්‍යාප්ත වේ. මෙම කාලය වන විට මෙරට ජීවත් වූ මධ්‍යශීලා වැසියන් බොහෝ විට මෙම මහා සංස්කෘතික ප්‍රවාහයට නතු වීමට ඉඩ ඇති බව උපකල්පනය කල හැක. මෙම සංස්කෘතික ප්‍රවාහ දෙකේ සම්මිශ්‍රනය වීම සමග නව

සංස්කෘතියක් මෙරට බිහිවීම මින් පසු දැකගත හැක. මෙම නව සංස්කෘතිය බිහිවීමේ දී ප්‍රාග් හා මූල ඓතිහාසික ප්‍රජාවන්ගේ පරිවර්තනය අප වඩා පහසුවෙන් හඳුනා ගන්නේ එවකට භාවිතා කරනු ලැබූ සන්නිවේදන සංකේත මගිනි. විශේෂයෙන් ම පුළුස්සනු ලැබූ මැටි මෙවලම් වල දැකගත හැකි අක්ෂර නොවන සංකේත වලින් සමහර සංකේත අපට හඳුනාගත හැක්කේ ප්‍රාග් ඓතිහාසික ගුහා කුලීන් සම්භවය ලැබූ ඒවා ලෙසය. කෙසේ වෙතත් අඛණ්ඩ ලෙස මේවා පරිවර්තනය වීම මගින් ඉතා විශ්වසනීය ලෙස අඛණ්ඩ සමාජ සන්නිවේදන සම්බන්ධතාවයක් පිළිඹිබු වන බව පෙන්වා දිය හැකිය (මැන්දිස් : 2004).

ශ්‍රී ලංකාවේ මූල ඓතිහාසික අවධියට සම්බන්ධ ජනාවාස හා සුසාන කුලීන් විශාල සංකේත ප්‍රමාණයක් මේ වන විට වාර්තා වී ඇත. දැනට හඳුනාගෙන ඇති ආකාරයට ශ්‍රී ලංකාව පුරා මේ යුගයට සම්බන්ධ සුසාන හා ජනාවාස ස්ථාන 44 ක් දැක ගත හැකි වේ (Seneviratne & Jayaratne: 2006). මෙයින් සුසාන වල සංකේත දැකගත හැකි වන්නේ පියන්ගල් කුල හා මැටි බදුන් කුලයි. ජනාවාස ස්ථාන වලදී අති බහුතරයක් සංකේත හමුවී ඇත්තේ මැටි බදුන් කුලීනි. අනුරාධපුරය, කන්තරෝදය, රිදියගම, අකුරුගොඩ ආදී ජනාවාස ස්ථාන වලින් හමුවන මැටිබදුන්වල මෙවැනි සංකේත හමුවීම අතිශයින්ම වැදගත් වේ. එමෙන් ම, ඉබ්බන්කටුව, පිංවැව, ගල් සොහොන් කනත්ත ස්ථානවල පියන්ගල් මත මෙවැනි සංකේත විශාල ප්‍රමාණයක් වන අතර පිංවැව ගල් සොහොන් කනත්තේ පමණක් එවැනි සංකේත 40 ක් හඳුනාගෙන ඇත (Senanayake: 1997). එසේම ලංකාවේ විවිධ ස්ථානවලින් හමුවූ කාලරක්ත වර්ණ මැටි මෙවලම් වල තවත් සංකේත 8 ක් පමණ වාර්තා වී ඇත (බිනරගම: 2008). ජ්‍යාමිතික, වෘත්තාකාර, ත්‍රිකෝණාකාර හැඩ ගන්නා බොහෝ සංකේත එයින් පූර්ව කාලයේ සංකේත වන ප්‍රාග් ඓතිහාසික සංකේත හා සමාන වන බව පහත සඳහන් සංකේත අධ්‍යයනය මගින් පැහැදිලි වේ.

මූල ඓතිහාසික යුගයට අයත් ස්ථානවලින් හමුවන සමාන සන්නිවේදන සංකේත

ඉබ්බන්කටුව	☐ ☐
රිදියගම	☐ ☐ ☐
අනුරාධපුර ඇතුළු නුවර	☐ ☐ ☐
රිදියගම	✂ ✂
අනුරාධපුර ඇතුළු නුවර	✂ ✂
අනුරාධපුර ඇතුළු නුවර	↓ ↓
රිදියගම	⌋

අනුරාධපුර ඇතුළු නුවර

රිදියගම

අනුරාධපුර ඇතුළු නුවර

රිදියගම

(Senevirathne:1984; බණ්ඩාර:2002)

මේ ආකාරයට මූල ඓතිහාසික සංස්කෘතියේ එකිනෙකට පරිබාහි ප්‍රදේශ ආශ්‍රයෙන් හෝ පැවැති ජනාවාසයන්හි සමාන ලක්ෂණ කිබීමෙන් ගමන වන්නේ මේවා බොහෝ විට තොරතුර සන්නිවේදනය සඳහා ප්‍රකාශන මාධ්‍යයක් වශයෙන් සංකේත භාවිතා කරන්නට ඇතැයි යන්නය. ප්‍රාග් ඓතිහාසික ගුහා සංකේත සමග මෙම මූල ඓතිහාසික සංකේත හා සැසඳුව හොත් එය ඒවා තුළ යම් ඒකාබද්ධතාවයක් දැකගත හැකිවන අතර ඒවා අබන්ධ

ලෙස යුගයෙන් යුගයට පරිණාමය වීම පිළිබඳව කරුණු මැනවින් තහවුරු කරයි.

**ප්‍රාග් ඓතිහාසික
සන්නිවේදන සංකේත**

**මූල ඓතිහාසික
සන්නිවේදන සංකේත**

තන්තිරිමලේ	ඵ	ඵ	ඹ	ආ	ඉබ්බන්කටුව/රිදියගම
තන්තිරිමලේ	ඡ	ඡ			අනුරපුර
ගොනාගොල්ල	ඡ	ඡ			අනුරපුර/රිදියගම
කොනත්තේගොඩ	ඡ	ඡ			අනුරපුර/රිදියගම
බුදුගල්ගේ	ඡ	ඡ			අනුරපුර

මෙවැනි භූමිකා සංකේත ඉන්දියාවේ මූල ඓතිහාසික අවධිය හා සැසඳීමේදී තවත් පැහැදිලි වනුයේ වඩා සාර්ව (මහා) ආකාරයට දකුණු ආසියානු කලාපය පුරා මහා සංස්කෘතීන් ලෙස හිස ඔසවා ඇති බවයි. එම සංකේත මගින් අනිවාර්යෙන් ම යම් අදහස් ප්‍රකාශ කිරීමක් මගින් තම අදහස් සහ තොරතුරු දැන හැකි බව පහත වගුව අනුව පෙන්වා ක්‍ෂය හැක.

**ලංකාවේ මූල ඓතිහාසික
සංකේත**

**ඉන්දියාවේ මූල ඓතිහාසික
සංකේත**

කොල්ලන්කනක්ක,		ඊ	ඊ	ඊ
පොම්පිප්පුව		ඊ		ඊ
අනුරාධපුර ඇතුළුව		ඊ		ඊ
අනුරාධපුර ඇතුළුව		ඊ		ඊ
අනුරාධපුර		ඊ		ඊ
රිදියගම අනුරාධපුර	ඊ	ඊ	ඊ	ඊ
අනුරාධපුර		ඊ		ඊ

(Seneviratne 1984; බණ්ඩාර: 2002).

මේ ආකාරයට මහා කලාප තුළින් හා ආංශුක කලාප තුළින් එකිනෙකට සමාන සංකේත දැකගත හැකිවීම මගින් වඩාත් පැහැදිලි වන්නේ අඛණ්ඩ සමාජ සම්බන්ධතාවය යම්කිසි ප්‍රකාශන මාධ්‍යක් මගින් සංකේත ඔස්සේ එළි දක්වා ඇති බවයි.

අනුරාධපුර ඇතුළුපුරයේ සිදුකරන ලද කැනීම් වලදී ප්‍රථමික යකඩ යුගයට (Early Iron Age) සම්බන්ධ ජනාවාස ස්ථරවල හමුවූ කාලරත්න වර්ණ මැටි බදුන් කැබලි කිහිපයක කාල නිර්ණ ලැබී ඇත්තේ ක්‍රි. පූ. 6-5 වන සියවස තරම් ඈත කාලයකට ය. එම මැටි මෙවලම්වල අන්තර්ගත පූර්ව බ්‍රාහ්මී අක්ෂර මගින් “බිය අනුරද” හා “තයා කුටේ” යන වචන අන්තර්ගතව තිබේ. විකිරනමාන දින නියම කිරීම් මගින් කාලය නිශ්චිත කර ඇති මෙම මැටි බදුන් පිළිබඳ දැරණියගල ප්‍රකාශ කරන්නේ ලංකාවේ අක්ෂර කලාව එතරම් පැරණි බව පිළිගත හැකි බවයි (Deraniyagala :1992). එසේ නම් මූල ඓතිහාසික වකවානුව තුළ දැක ගත හැකි වූ විවිධ ජ්‍යාමිතික හැඩ ඔස්සේ ගොඩනැගුණු සංකේත ක්‍රමය ක්‍රි. පූ. 600 - 500 වනවිට පැවති සන්නිවේදන සංකේත අක්ෂරය දක්වා පරිවර්තනය වී තිබුණ බව පිළිගත හැකිය. එසේම මූලාශ්‍ර තොරතුරු අනුව අනුරාධ නැමැති නාමය අනුරාධපුරයේ මුල්ම ග්‍රාම පිහිටුවීම සම්බන්ධ කථාකිරීමේ දී මූලාශ්‍ර වල සඳහන් තොරතුරු මගින් හඳුනාගෙන තිබීම ද යම් මට්ටමකට ඓතිහාසිකත්වය පිළිබඳ තොරතුරු සන්නිවේදනය කිරීමටත් උපකාර කරන්නකි. කෙසේ වෙතත් ලිඛිත සන්නිවේදන කරුණු වලට අනුව හමුවී ඇති අක්ෂර සාධක මෙය සනාථ කිරීමට වැදගත් වේ.

ශ්‍රී ලංකාවේ මුල් ඓතිහාසික අවධිය හා සංකේත පරිණාමය

නිශ්චිත වශයෙන් ම ශිලා ලේඛන ආරම්භ වූ වකවානුව මුල් ඓතිහාසික අවධිය වශයෙන් පුරාවිද්‍යාඥයින් අර්ථ දක්වයි

(සෙනෙවිරත්න : 1996). මෙය ශ්‍රී ලංකාවේ සංකේත භාවිතයේ ඉතිහාසයේ ඉතාම වැදගත් අවධියක් වේ. ක්‍රි. පූ.300 - ක්‍රි. ව. 100 කාලයට අයත් වන කාලයේදී දිවයින පුරා අභිලේඛන 1200 කට වඩා වැඩි ප්‍රමාණයක් වාර්තාවී ඇත (Paranavitana: 1970). මෙසේ හමුවන බොහෝ බ්‍රහ්මී ශිලා ලිපිවල එක් පසකින් යම් යම් සංකේත දැකගත හැක. මෙම සංකේත පිළිබඳව විමර්ශනාත්මකව සොයා බැලීමෙන් පැහැදිලි වන්නේ මේවායේ හැඩ ලක්ෂණ බොහෝ සෙයින් මූල ඓතිහාසික පියන්ගල් මත හා කාලරක්ත වර්ෂ මැටි මෙවලම් (Black and Red ware) වල දැකගත හැකි සංකේත වලට සමාන බවයි. ශ්‍රී ලංකාවේ මෙතෙක් සිදුකොට ඇති සමාජ පුරාවිද්‍යා පර්යේෂණ (Social Archeology) වලට අනුව පැහැදිලි වී ඇති දෙය නම් මෙම ශිලා ලේඛන වල අන්තර්ගත සංකේත වල අඩංගු ජන කණ්ඩායම් එනම් පරුමක, ගහපති, ගමික, බත, බරත, අෂ, කුටුබ්බ ආදීන් මූල ඓතිහාසික යුගය (proto) තුළින් සම්භවය ලැබුවන් බවයි (සෙනෙවිරත්න : 1996). එසේම ඔවුන් ප්‍රධානය කරනු ලැබූ ලෙන්වල ශිලා ලිපි වල පසෙකින් අක්ෂර නොවන සංකේත සටහන් කරනු ලැබුවේ තමන්ගේ පදවිය තම කුලය හෝ වංශය පිළිබඳව සම්බන්ධතාවය පෙන්වීමේ අදහසකින් බව සුදර්ශන් සෙනෙවිරත්න පෙන්වා දෙයි (සෙනෙවිරත්න : 1996). මේ තත්වයට අනුව පැහැදිලි වන්නේ මෙවැනි සංකේත බොහෝමයක් මගින් අබන්ධ සමාජ පසුබිම පැහැදිලිවන බවයි. පහත සඳහන් වගුව තුළින් මූල හා මුල් ඓතිහාසික අවධි තුළ වූ සංකේත පිළිබඳව යම් සහ සම්බන්ධතාවයන් පවතින බව පෙන්වා දිය හැක.

මූල ඓතිහාසික සංකේත

මුල් ඓතිහාසික ශිලා ලිපිවල ඇති සංකේත

අනුරපුරය	☸	☸	රිටිගල
අනුරපුර පොම්පරිප්පුව	卍 卐	卍	රිටිගල
අනුරපුර රිදීගම	卐 卐	卐 卐	අනුරාධපුරය
රිදීගම	☸	☸	සිතුල්පව්ව
අනුරපුර කත්තරෝදය	卐 卐 卐	卐	අනුරාධපුර
පොම්පරිප්පුව	卐 卐 卐	卐 卐	පරමාකන්ද
අනුරපුර	卐	卐 卐	මිහින්තලේ
අනුරපුර	卐 卐	卐	රිටිගල
රිදියගම	卐 卐	卐	වෙස්සගිරිය

මේ ආකාරයට සංකේත මගින් යම් ප්‍රකාශනයක්, ග්‍රෝහය, කුලය හෝ සමාජ සම්බන්ධතාවය අඛණ්ඩව ප්‍රාග් ඓතිහාසික යුගයේ සිට මුල් ඓතිහාසික යුගය දක්වා පැවැති ආකාරය මේ වගුවට අනුව පෙන්වා දිය හැක.

ප්‍රාග් ඓතිහාසික

මූල ඓතිහාසික

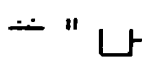
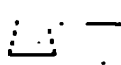
මුල් ඓතිහාසික

යුගය

යුගය

යුගය

කන්තිරිමලේ



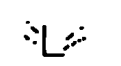
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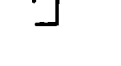


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මුදුගල



ගල්ලෙන විහාරය

(Seneviratne :1984).

ඉහතින් විස්තර කරනු ලැබූ සංකේත පිළිබඳව සාකච්ඡා කිරීමේ දී මෙතැන් පටන් ම වානිජ කටයුතු හා සම්බන්ධ වූ බවද පැහැදිලි වේ. ලංකාවේ හමුවී ඇති හස්ඵබ්ධ, ස්වස්තික, ලක්ෂ්මී ආදී කාසි බොහොමයක මෙම සංකේත වලට සමාන සංකේත දැකගත හැකිවීම අප ඉහතින් විස්තර කරන ලද ක්‍රියාවලියට සමාන වේ. එසේ ම මෙම අක්ෂර නොවන සංකේත මගින් ගැඹුරු අදහසක් ප්‍රකාශ කරන බව මෙම තත්වය අනුව පැහැදිලි වන අතර මේ පිළිබඳව අවධානය කර ඇති පී.ඊ.ඊ. ප්‍රනාන්දු පවසන්නේ මේවා ඉන්දීය හා දේශීය බ්‍රහ්මී අක්ෂර රූපවලට වඩා වෙනස්කම් හා සමානකම් පවතින බැවින් සිංහල අක්ෂරවල සම්භවය ක්‍රි. පූ. 600 - 500 දක්වා අතීතයට විහිදෙන කරුණ පිළිගත හැකි බවයි (ප්‍රනාන්දු 1969). ලංකාවේ හමුවූ බ්‍රාහ්මී නොවන සන්නිවේදන සංකේත දෙස බැලීමේදී ඒවා තුලින් බ්‍රහ්මී අක්ෂරය සම්භවය වූ ආකාරය හඳුනාගත හැක්කේ ඒවායේ හැඩ ලක්ෂණ පරීක්ෂා කිරීම මගිනි. විශේෂයෙන් බ්‍රාහ්මී අක්ෂරවල දැකගත හැකි හැඩතල අක්ෂර නොවන සංකේත වල පවතින ආකාරය පහත සඳහන් වගුව අනුව පෙන්වා දිය හැක.

<u>සිංහල</u>	<u>බ්‍රාහ්මී</u>	<u>බ්‍රාහ්මී නොවන සංකේත</u>	
ම	𑀮	𑀭	අනුරපුර/රිදියගම
බ		𑀭𑀮	ඉබ්බන්කට්ටුව
ය		𑀭𑀮	රිදියගම
ත	𑀯	𑀯	අනුරපුර/ රිදියගම
හ	𑀰	𑀰	අනුරපුර
ව	𑀱	𑀱	අනුරපුර
ශ	𑀲	𑀲	රිදියගම

නිගමනය

මේ ආකාරයට ලංකාවේ සන්නිවේදන සංකේත පිළිබඳව විමසා බැලීමේදී ඒවා ප්‍රාග් ඓතිහාසික අවධියේ සිට මුල් ඓතිහාසික අවධිය දක්වා විත්‍ර අක්ෂර, කුරුටු අක්ෂර, සංකේත අක්ෂර වශයෙන් ශ්‍රී ලංකාවේ භාෂාව, සන්නිවේදනය, ප්‍රකාශනය විකාශනය සඳහා මූලික පදනම සැකසී ඇති බව පැහැදිලි වේ. එසේම වර්තමානයේ අප භාවිතා කරන සන්නිවේදන සංකේත අතීත සන්නිවේදන සංකේත වලට විකාශනයක් බව පැහැදිලිය-

ආශ්‍රිත ග්‍රන්ථ නාමාවලිය

දැරණියගල සිරාන්, (1986), ආදිමානවයන්ගේ රහස් හෙලිවේ **සිවමිණ ශාස්ත්‍රීය අතිරේකය** (1986 ඔක්තෝබර් 12 19)

පීරිස් මර්ලින්, (2002), **පැරණි මිසරය** ඇස්- ගොඩගේ සහ සහෝදරයෝ, කොළඹ

ප්‍රනාන්දු පී.ඊ.පී, (1964), **සිංහල අක්ෂර මාලාවේ ආරම්භය ශ්‍රී ලංකාවේ අධ්‍යාපන සියවස**, සංස්කෘතික අමාත්‍යාංශය කොළඹ

බිනරගම දයානන්ද, (2008), **ශ්‍රී ලංකාවේ ප්‍රාථමික විත්‍ර කලාව හා ප්‍රාථමික ලේඛන කලාව**, ඇස් ගොඩගේ සහ සහෝදරයෝ, කොළඹ

බණ්ඩාර තිස්ස, (2002), හම්බන්තොට ආශ්‍රිත ඓතිහාසික පුරාවිද්‍යාව, **වැලිපිල පුරාවිද්‍යා සඟරාව** 05 වන කලාපය, ඒකාබද්ධ පුරාවිද්‍යා උපාධිධාරී සංගමය, මධ්‍යම සංස්කෘතික අරමුදල

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Poster Presentations

Role of the Department of Library and Information Science, University of Kelaniya in LIS Educational Sector in Sri Lanka

Prof. Piyadasa Ranasinghe

Dr. W.A. Weerasooriya

S.A.D.H. Namali Suraweera

1. Introduction

The Department of Library and Information Science (DELIS) in the University of Kelaniya was established in 1972 in response to Government policy of the period to introduce job-oriented professional studies programmes in universities, with the aim of combating the ever rising unemployment problem of the graduates in the country. It was also envisaged to conduct Postgraduate courses for librarians, who otherwise had to go to foreign countries to obtain very expensive postgraduate qualifications.

2. Vision of the DELIS

1. To provide the intellectual and professional foundation to the students for careers in librarianship and information services

2. To provide the skills and competencies in the management of libraries information centres, information resources, services and products
3. To produce a pool of responsible, committed and balance minded professionals in this discipline
4. To provide postgraduate qualifications and skills for working librarians who need such qualifications and training for their promotions and career development.
5. To conduct research in the field of Library and Information Science, and to develop a strong research culture in the discipline within the country.

3. Mission of the DELIS

The mission is to improve the quality, standard and the relevance in education and research in this discipline with the aim of producing well trained, skilled, and competent resource persons necessary for library and information sector in Sri Lanka and the rest of the world.

4. Goals / Objectives of the DELIS

Library and Information Science deserves the leadership role in handling managing and marketing the information in the recurrent knowledge economy. As a subject, Library and Information Science endeavors

1. To educate professionals on the nature of the universe of knowledge and its different contents and scope viz. subjects and information sources, respectively.

2. To inculcate the knowledge management and knowledge organization skills in the society where different types of libraries, information and documentation centers cater to the community's information needs
3. To introduce the different types of knowledge organization systems and their utilization for the storage, retrieval and the dissemination of information.

5. Aims and Learning Outcomes

5.1 Aims

- ♦ Deliver the relevant curricula for each Degree/Diploma programme that enhances a broad understanding of the subject area together with expertise and critical handling and know-how.
- ♦ To provide students the knowledge and competency to work in any library and Information environment with particular reference to IT applications in the field.
- ♦ To inculcate in the students learning aptitude and groom their research potentials
- ♦ To enable the in- service information professional to update and expand their professional expertise and IT knowledge and skills
- ♦ To provide the necessary expertise and know-how in information field, for the library and Information centers through advise and consultation on demand
- ♦ To inculcate and foster the attitudes of a duty conscious work culture among students through practical work experience

- ♦ To develop critical and analytical thinking ability of students, enabling them to become effective decision makers and researchers for the development of their profession.
- ♦ To prepare all students as capable, competent and responsible citizens in the information society (Subject Review Report, 2008)

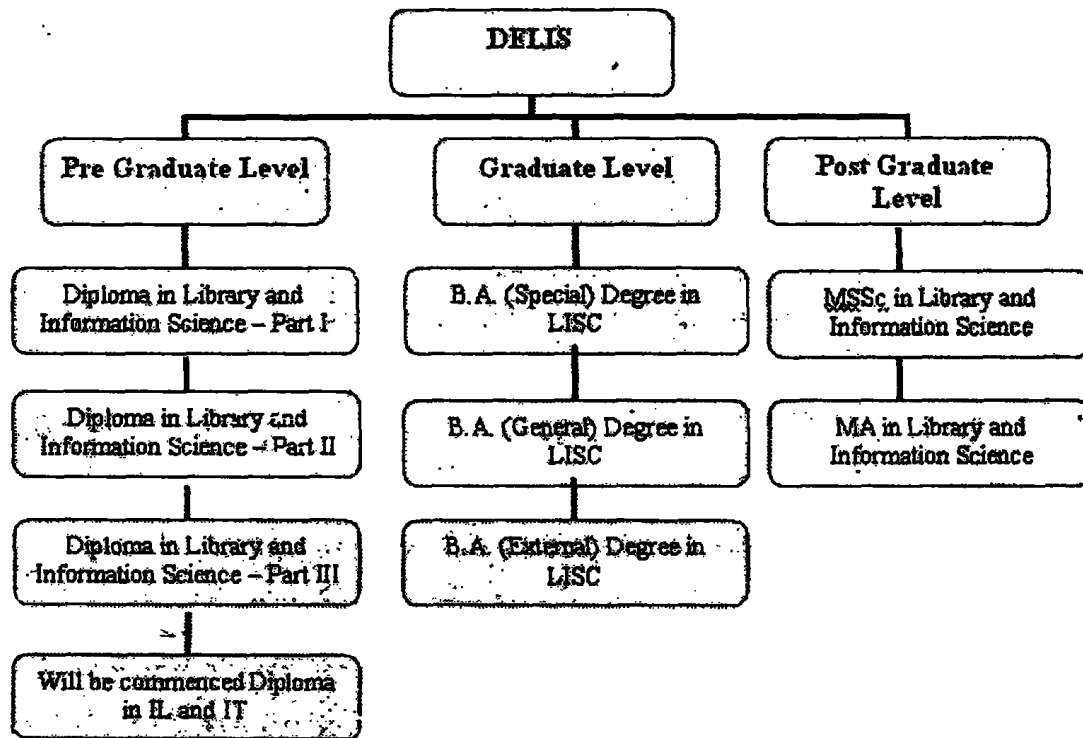
5.2 Learning Outcomes

At the end of each study programme students will

1. Be able to demonstrate an understanding of the types and nature, origin, collection, organization and delivery of information and its uses. the interaction between information and its users and the appropriate latest technology and systems that produce, analyze and disseminate information.
2. Be able to apply the theory and practice in relevant subjects areas where and when necessary.
3. Have acquired and put into practice up-to-date subject knowledge, techniques, professional judgment and appropriate behaviors and competencies relevant to the job market.
4. Be able to work as true professionals, lifelong information workers and learners with necessary understanding and expertise
5. Be competent and skilled leaders, managers and communicators with team spirit, correct professional judgment and attitudes (Subject Review Self Evaluation Report, 2006)

6. Study Programmes

The DELIS offers the Pre graduate level, Graduate level and Post graduate level Academic and Professional Degree programmes (Figure 1)

Figure 1 - Study programmes of DELIS

7. Quality of educational program of the DELIS

The Subject Review Process of the University Grants Commission (UGC) involves appraising the quality of education within a specified subject or discipline focusing on the student learning experience and achievement. This Subject Review Process evaluates the quality of both undergraduate and postgraduate educational programmes.

The Subject Review Process was conducted at the DELIS, from 03rd to 05th March 2008. The Quality of Education of the DELIS was reviewed by the Review Team according to the following eight aspects at the department level. The Review Team's judgment is summarized below (Table 1)

Table 1 Subject Review Team's judgment

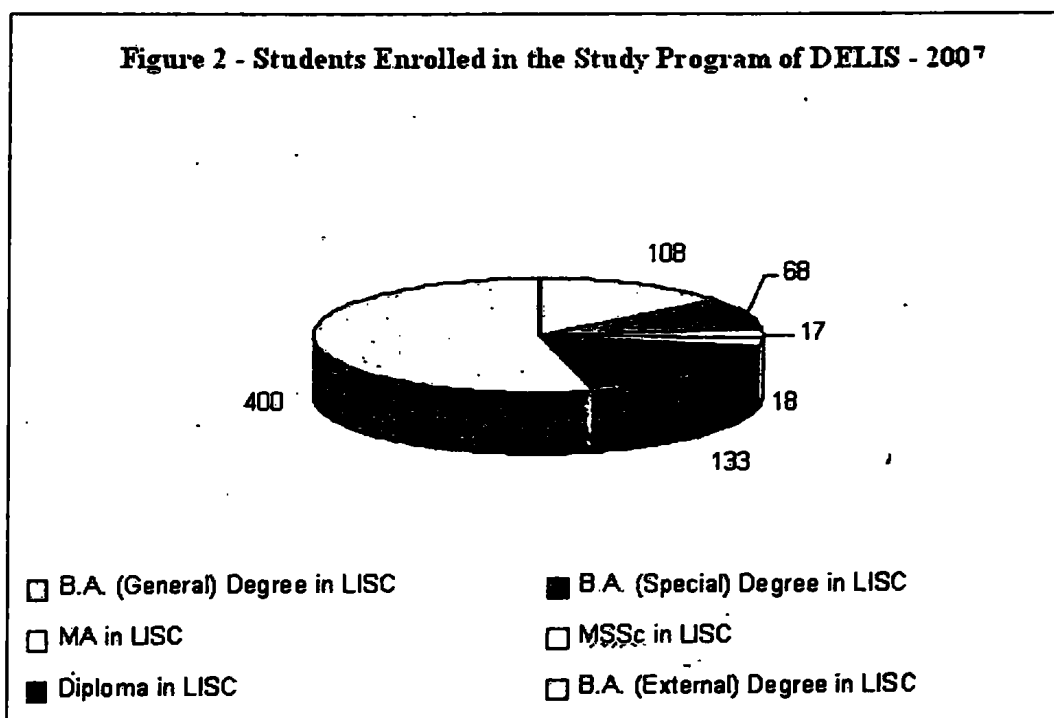
Aspects Reviewed	Judgment Given
Curriculum Design, Content and Review	Good
Teaching, Learning and Assessment Methods	Good
Quality of Students including student progress and achievements	Good
Extent and use of student feedback, qualitative and quantitative	Satisfactory
Postgraduate Studies	Good
Peer Observations	Satisfactory
Skills Development	Good
Academic Guidance and Counseling	Good

Source: Subject Review Report 2008

8. Students and staff

8.1 Students

As at 30th November 2007 the number of students enrolled in the study programmes of the DELIS as shown in Figure 2.



Source: Subject Review Self Evaluation Report 2006

8.1.1 Number of students graduated from DELIS

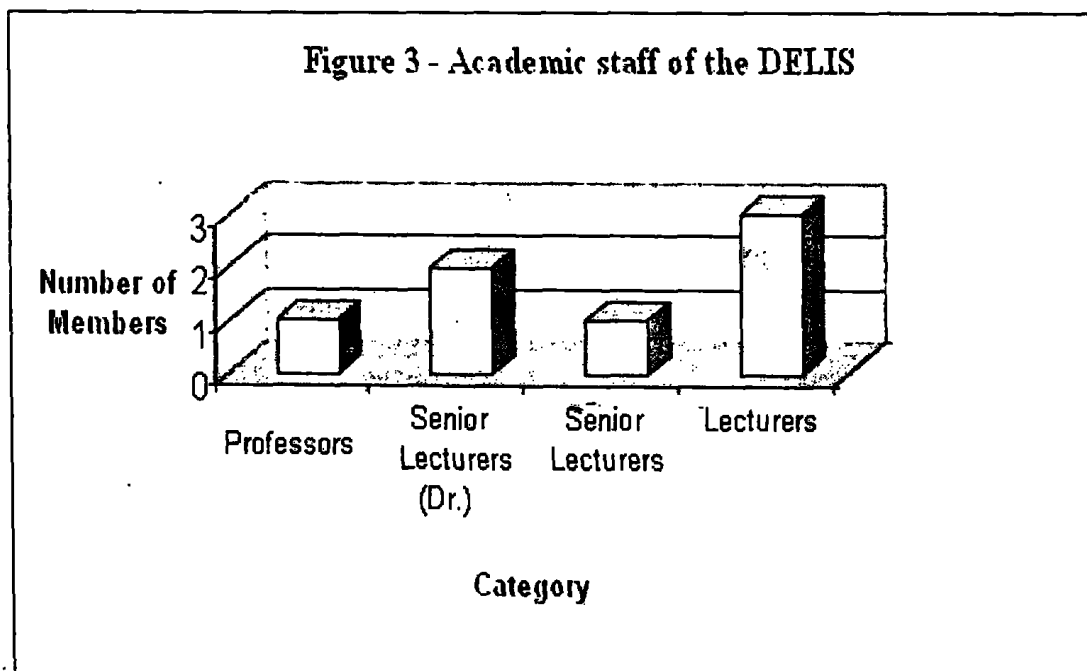
The table 2 shows the number of students graduated from DELIS in B.A. (General), B.A (Special), MA and MSSc programmers in the year 2002 2006

Table 2 - Number of students graduated from DELIS

Programme	Number of Students Graduated				
	2002	2003	2004	2005	2006
B.A. (General) Degree	278	127	110	122	108
B.A. (Special) Degree	38	51	60	69	68
MA	0	3	3	7	17
MSSc	0	7	9	8	18

8.2 Staff

The DELIS has qualified staff members to conduct study programmes and other activities in the Department (Figure 3).



9. Academic guidance and counseling providing by DELIS

DELIS is providing following academic guidance and counseling to the students.

- ◆ In each lecture, at least five to ten minutes are spent on providing appropriate academic guidance and counseling. Problems and difficulties related to academic matters of the students are discussed mostly in tutorial sessions.
- ◆ The Departmental staff-student committee called “Library and Information Science Student Association” is a formal key mechanism for addressing matters of students including social welfare and certain academic work such as publishing the journal of the student Association. It meets at least three times a year. This association is valued by both students and staff, and the Department is aware of the importance of addressing those matters of interest to students.
- ◆ The Department has recognized three key areas the students should be acquainted with. These are
 1. Knowledge and practice of the subject
 2. Use of English language
 3. Knowledge and aptitude in IT

Fulfilling the objectives of the above areas, annually students are instructed to form three societies, consisting office bearers for each society named (1) Library society (11) English Language society and IT society respectively. Three Lecturers are appointed from the Department in order to supervise and advise each student society. This is a supplementary procedure for developing competencies of the students. Proper advice and guidance are provided to develop students’ communication skills and team work through this procedure.

- ♦ As a routine students are advised to take part in the seminars, lectures, workshops conducted by the National Library and Documentation Services Board and other national institutes devoted to the profession. Generally the Department provides transport for students for this purpose.
- ♦ The Department maintains a favorable links with other students support services available in the university like, Student Welfare Branch, Career Advisory Unit, Kalana Mithuru Unit. Students are advised to attend the seminars, workshops, special lectures, job- fares conducted by these units and encouraged to share their experiences with students from other Departments.
- ♦ Department maintains a separate database for newly passed out students of all undergraduates and Diploma programs in order find and provide suitable training and job opportunities. One lecturer is assigned to coordinate this career guidance program, while Head of the Department and teaching staff liaise closely with employers of both private and public sector.
- ♦ The Department tries to display all job advertisements appeared in daily newspapers and Sri Lanka gazette in the Departmental notice board (Subject Review Self Evaluation Report, 2006).

10. Competency Development

Three areas of competencies have been identified, applicable in the Sri Lankan context for the student of DELIS .

- 1. Knowledge, understanding and practice of the subject.**
- 2. Communication**
- 3. Management and administration**

10.1 Competencies related to the area of knowledge, understanding and practice of the subject.

- ◆ Interaction with users and clients
- ◆ Knowledge of the LIS environment
- ◆ Knowledge of the Sri Lankan administrative and legal framework related to librarianship
- ◆ Identification and validation of information Sources
- ◆ Collection development and collection management
- ◆ Physical handling of documents
- ◆ Organization and storage of Information
- ◆ Information seeking
- ◆ Analysis , presentation, and repaeleaging of information
- ◆ User awareness and satisfaction

10.2 Competencies relevant to communication

- ◆ Oral communication
- ◆ Written communication
- ◆ Using a foreign language (English)
- ◆ Use of multimedia
- ◆ Interpersonal communication
- ◆ Information technologies: computing , networking and digitization ,www.
- ◆ Production and publishing systems

10.3 Competencies related to management and Administration

- ◆ Administrative practice and understanding organization, and its culture
- ◆ Marketing and public relations

- ♦ Purchasing and supply procedure: Tender calling
- ♦ Maintenance and Physical organization, and equipment planning
- ♦ Techniques of planning and project management
- ♦ Techniques of research and evaluation
- ♦ Leadership qualities
- ♦ Analytical and problem solving techniques
- ♦ Creativity
- ♦ Techniques of Human resource management

11. DELIS Publications

1. Pusthakala Vidya
2. Pusthakala Vidya Lekana Samuchchaya
3. Vidyārthi
4. Library and Information Science Newsletter

12. Alumni Association of Library and Information Science

The Department of Library and information Science has formed an Alumni Association gathering all its graduates, postgraduates and diploma holders with the intention of furthering the development of the Library and information Science profession in Sri Lanka. The Association, while addressing the issues relating to the profession, has focused on the academic development of the membership and original research in the field of Librarianship. Its annual publication "Vidyārthi" provides a wider forum for members to publish their research findings.

The Association intends to become the most powerful profession body in the field of Librarianship in Sri Lanka in the years to come (University of Kelaniya Calendar, 2006)

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13. Conclusion

The DELIS is conducting a range of academic and professional study programmes and It is adequately coverage of the discipline of LIS. Through above programmes an activities DELIS is producing well trained, skilled, and competent resource persons necessary for library and information sector in Sri Lanka and the rest of the world. Therefore the Department of Library and Information Science, University of Kelaniya is playing vital role in LIS educational sector in Sri Lanka.

14. References

1. Subject Review Report (2008), University Grant Commission, Colombo, Sri Lanka
2. Subject Review Self Evaluation Report (2006), Department of Library and Information Science, University of Kelaniya, Kelaniya, Sri Lanka.
3. University of Kelaniya Calendar (2006), University of Kelaniya, Kelaniya, Sri Lanka.

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