Chapter 2

Knowledge Acquisition :

Issues and Strategies

2.1 Introduction

The revolution in information and communication technology has given rise to a new factor which is considered the indicator of the nation’s economy - the “knowledge factor” which is now regarded as the key resource for a country. With the help of the IT, the knowledge dissemination can be done in no time today. But the knowledge acquisition is one of the most intricate and challenging areas.

Knowledge has been the focus of the researchers since the fifth century BC and extensive research was undertaken by them. As the Industrial Revolution started, the information became one of the essential commodities and gave rise to the Information Society. The Industrial Revolution witnessed the importance of the managerial capabilities. This gave rise to the development of scientific management and knowledge-based or expert systems.

The knowledge acquisition is one of the major building blocks of the knowledge-based systems and is a starting point of the knowledge management in the libraries. With the help of the IT tools, it is becoming relatively simpler to tap the knowledge resources for otherwise it would not have been easy to accomplish this work without the assistance of the computing technologies. The inadequate acquisition of knowledge is a major obstacle in the development and application of effective knowledge-based systems. The knowledge acquired must be accumulated in the knowledge warehouse of the libraries. Extensive research programmes are being conceived worldwide to work on the knowl-
edge acquisition methodologies, techniques and also the tools to acquire knowledge. The chief aim of Knowledge Acquisition is the capabilities acquisition. (1)

The knowledge that is acquired but not used is data that represents experience. If it is tacit in nature it is passive knowledge but becomes information if it is coded. Active knowledge is one which is used for the problem-solving capability and supports a skill if it is tacit and becomes know-how if it is coded. (2)

Before I focus on the issues concerning knowledge acquisition, it will be appropriate to discuss the characteristics of knowledge which makes it a useful resource.

2.2 Knowledge Cycle

The three tasks of Knowledge Management include application, distribution and cultivation of knowledge. The application of knowledge management undoubtedly brings in more evidence of results and it becomes more prominent with improved distribution and cultivation. We should always develop the skills in applying knowledge since no significant process can be made merely by the distribution and cultivation of knowledge. Each particular process contributes to the overall growth and value of knowledge. (3)

2.2.1 Application

The application of knowledge in any sphere of life brings in greater perfection is the way we perform our tasks. That increases effectiveness, output, etc. It is very vital that we know how to apply knowledge in various processes. Unless and until we emphasise the application of knowledge, much of the knowledge is left underutilised which could lead to the elimination of the value and could easily fail to generate returns on the investments. A good example can be cited of Xerox's famed Palo Alto Research Centre.
The Centre was unable to apply the knowledge of graphical user interface. They gave this knowledge to Apple who made a great value from it.

### 2.2.2 Distribution

The distribution of knowledge is yet another essential factor. The dissemination of knowledge ensures that knowledge becomes available to the right people, at the right place and at the right time. It is of utmost importance that information overload does not happen and the knowledge plays an important role in it. The self-organised and self-balancing mechanisms need to be used in order to avoid the information overload. If the knowledge distribution system is good, it also facilitates that the knowledge flows through the right channels and reaches the right people at the right time. For effective distribution of knowledge, the current day Information and Communication Technology plays a pivotal role in building up massive information networks. Knowledge distribution also occurs through human networks, e.g. by using Listservs on the Net, people seek guidance from others and share their technical knowledge in resolving their problems. These problems generally pertain to the installation of software, hardware, troubleshooting work, etc.

### 2.2.3 Cultivation

The cultivation of knowledge is indeed a very promising task. We must keep cultivating knowledge so that the knowledge storehouse remains full. Since knowledge is continuously consumed there is a need for the continuous increase in the knowledge base of an organisation or a society. An example can be cited here of the Nokia Company in Europe which started their ventures from papers to chemicals, and rubber to a telecommunication company. They kept cultivating knowledge about radio transmission and emerged as a motivator of mobile communications and audio visual signal processing.
The continuous need for knowledge cultivation is being felt more in the industries wherein the knowledge loses its value more quickly and also where the copycat competition urges the need for rapid knowledge cultivation. The R&D organisations need to test new technologies on a regular basis.

2.3 The Characteristics of Knowledge

After presenting the importance of the applications of knowledge, it is important to identify the distinct features of knowledge. Some of these characteristics are mentioned below. (4):

2.3.1 Knowledge is Subjective

The knowledge gained by an individual from information depends considerably on the mental framework, background, the person’s areas of interest and its direct analogy/relation with the information. For example, the information about the Tsunami hit areas in India was taken differently by different people. A person from the insurance industry generally looked into the facts based on the extent of damages claimed by people and how insurance agencies would tackle such a situation. The government officials from, Natural Disaster Management group generally tried to find immediate measures that need to be taken for bringing relief to the people. The WHO officials would think in terms of medication and vaccinations needed for the people who are trapped in the area. The people’s relatives would be anxious to know about the well-being of their close relatives and friends. Knowledge thus means different things to different people. There are always different interpretations, various viewpoints and multiple context-based variations while commenting or acting on a situation. This is all because of the subjective nature. Communication is one such tool which is considered to be the key component in overcoming subjectivity.
2.3.2 Knowledge is Transferable

Knowledge can be transferred. It can be passed from one person to another. The knowledge about a process, a product or a task can definitely be used to produce better and more effective results in another area. The traditional knowledge which is available in India is extensively utilised by the industrial houses, etc within and outside India to achieve better results. In every field of knowledge there are examples of transference of knowledge from one person to another, from one group to another group and from one country to another country.

2.3.3 Knowledge is Embedded

Knowledge is often hidden or in other words, it is embedded in the mind of the person who possesses it or in the libraries wherein the information is stored either in print or electronically. It is imperative that we should be able to extract this hidden knowledge using certain techniques and methodologies. Human knowledge, if it is not recorded, documented or extracted, perishes forever. It is therefore important that we must tap human knowledge and preserve it for our future use. The same problem occurs with the knowledge lying in books in libraries, databases, etc wherein the knowledge has no value as it is not regularly used. This knowledge must be extracted and made available to researchers and scholars. In India, the rural masses are knowledgeable in their field of interest and the knowledge which they possess is more restricted to their own villages or their immediate surroundings and this knowledge never gets disseminated to others who could make better use of their knowledge. Since the knowledge is embedded there is a need to mine.

2.3.4 Knowledge is Self-reinforcing

The spread of knowledge in a group or an organisation often leads to better dissemination. There is no denying the fact that if harmful know-how is leaked to others, it
could lead to negative results. The sharing of knowledge does not lead to the loss in its value or use and moreover the knowledge is unquantifiable. In the knowledge sharing process, the original knowledge holder keeps the knowledge even after it has been shared and the knowledge receiver gains the knowledge thereby leading to the wider application of the knowledge, contributing to value and at times the recipient puts in more effort and extra knowledge to it and creates more value. For example, if more nodes are added to a network, the network becomes more valuable.

2.3.5 Knowledge is Perishable

Knowledge is power and its value can increase instantaneously at any point in time but with the passage of time it begins to perish. For instance in the early 1990s, there were few library professionals who were acquainted with the use of the CDS/ISIS software package but as time passed, more and more professionals were trained and this knowledge began to lose its value for those who were the early beginners. In today’s era of information and communication technology, the information is transmitted rapidly and there is a great deal of competition for using the knowledge for patenting the products.

2.3.6 Knowledge is Spontaneous

It is believed that Gautam Buddha attained knowledge spontaneously while meditating in Lumbhini. Similarly, knowledge is believed to emerge spontaneously and is rarely generated on demand. Knowledge can be gained after rigorous brain storming sessions or R&D activities.

2.4 Issues for Knowledge Acquisition

A considerable amount of knowledge is dispersed in developing countries which could help them socially and economically. They are unable to get favourable results mainly because of the bottlenecks in the knowledge acquisition processes.
To acquire knowledge for building up the knowledge bases, several practical difficulties are encountered. The following are the main reasons:

### 2.4.1 Knowledge’s Availability in Many Forms

The knowledge is available in many forms—be it human knowledge available with the faculty, researchers, scholars, technical staff in the Institutions; the knowledge available through the printed world and stored in books, journal articles, theses, newspapers; traditional knowledge available with the people at large and the centres of traditional knowledge, the knowledge which can be acquired from the published digital and Web resources including Digital Libraries, bibliographic databases, etc. It is very difficult to assemble and consolidate all the available knowledge which is needed for improving the knowledge bases and presenting them as one single entity.

Knowledge can also be categorised as: Internal Knowledge and User Knowledge. The Internal Knowledge refers to a vast amount of information and knowledge which is available within the minds of the employees of an organisation. The knowledge stored in the minds remains untapped owing to the non-availability of processes that could codify knowledge. For instance, the knowledge of several R&D scientists, faculty and senior scholars escapes the attention of the knowledge workers since their knowledge remain unmapped. The Library and Information Science professionals have to perform the task of tapping this knowledge component and making it available for use. Also there is a greater need for making available the knowledge of the experts and the technical staff. It would be relevant for the library staff to work in the knowledge sector and tap this knowledge.

User Knowledge is a part of knowledge which is available with our user community to who we provide day-to-day services. We often miss them out by not considering them as the potential contributors of new knowledge. In libraries a sizeable number of
reference queries are attended to and knowledge is imparted to the users. Even for the troubleshooting work, the vital information is provided to them but we do not tap the knowledge which resides in the minds of our users. (5)

2.4.2 Management of Large Knowledge Bases is Tedious

As the knowledge bases increase in size, the maintenance of the system requires good capacities of the software tools for undertaking the many tasks including the knowledge editing, validity checking of the knowledge available and disseminated it through knowledge bases. It may also not be feasible to reorganise this updated knowledge globally across the several domains and networks. Moreover in the libraries, the library professionals are unfamiliar with knowledge tools and they find it difficult to handle the large knowledge-bases.

2.4.3 Non Use of the Previously Encoded Knowledge

It is often seen that the new knowledge is created every now and then and there is not much utilisation of the previously encoded knowledge. Documents in libraries and archives remains less used. Organised efforts need to be made in this direction in libraries.

It is found that the mechanisms for transmission in libraries are not proper and systematised. The knowledge delivery mechanisms have to be well developed so that knowledge can reach the users effectively.

2.4.4 Lack of the Production of Local Knowledge in the Local Languages

In a country like India where the majority of the population still lives in villages, it is advisable to produce knowledge in the local languages. Only then can we expect knowledge to be used by those who need it. Thus the knowledge component can really be beneficial in raising the standards of living. There is also the need to translate the success stories of the knowledge acquisition keeping in mind its local application and usability.
Special mention needs to be made of the efforts made by CDAC (Centre for Development of Advanced Computing), NIC and a number of NGOs for developing the technologies and tools for creating the content in the Indian languages. CDAC has developed Gyannidhi: a parallel corpus for Indian languages. (6)

2.4.5 Non Support of the Management

It has been noticed that the knowledge activities in libraries are still a far reality since top-level managements do not entrust the librarians or the Library Science professionals with the work of knowledge acquisition, knowledge transfer, knowledge utilisation, etc. Even thought the staff wants to bring in the change from below, the management is not supportive of assigning this job to the librarians. Senior managements in the organisations do not recognise the valuable roles librarians can play and as a result, do not involve them with the knowledge initiatives and programmes.

Most of the organisations lack the culture within the organisations for knowledge sharing and this is true in case of knowledge intensive organisations as well. Several research and development organisations in India do not have a policy for the knowledge sharing or knowledge acquisition activities. The knowledge which is generated either remains closed in the files and systems or remains available in the format which users find hard to use.

2.4.6 Poor People Management

It is found that manpower in institutions is not properly motivated. It is very difficult to tap and acquire their intellect and inputs. They show their unwillingness to share their knowledge with others. The major apprehensions among them are that by sharing their knowledge with others their importance in the organisations may be minimised and they may lose their credibility. It is desirable that the clear cut Institutional Policies for Knowledge activities should be in place at each individual institution. Moreover there
should be a clear communication of them to each research scholar when he joins wherein he should understand that all his research work will be shared with others. Also, there should be proper incentive schemes for those who participate in knowledge acquisition, sharing and transfer processes.

2.4.7 Unfamiliar Technology

There is a greater need to emphasise the fact that technology is merely an enabler but it can pose serious threats to the organisations in the acquisition of knowledge if it is not properly used. The organisations that want to initiate the knowledge activities are generally unfamiliar with the knowledge technologies and find it difficult to start working on the knowledge technology.

The survey results shows that 67.3 percent of the library staff is aware about the knowledge technologies.

<table>
<thead>
<tr>
<th>Familiarity</th>
<th>Colleges</th>
<th>Institutes</th>
<th>Universities</th>
<th>Research/ Special</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>Yes/No</td>
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<td>(N=45)</td>
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<td>(N=30)</td>
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<td>(9.1)</td>
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<td>18</td>
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<tr>
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<td>(60.0)</td>
<td>(67.3)</td>
</tr>
</tbody>
</table>

Chi-Square 6.9 Significant at .073 level

Note: Figures in parentheses are the percentage
2.5 Knowledge Acquisition on the Web

The World Wide Web is a major resource tool for knowledge acquisition. However, through it, it is really difficult to find which information in it is reliable. Since anyone and everyone can publish the information on the Web, the unreliability factor remains the primary obstacle in the online access. With the help of the Web, one can acquire diverse knowledge from various sources in no time which otherwise would have taken considerable time and effort to locate. Since in the case of Web acquired information, the credibility factor is the important one. Initiatives like the TrueKnowledge Search engine, improve the credibility of the data. It is considered as a mighty tool for the knowledge search. (7)

There is a need for the smarter search engines which can know what is being demanded by the users. They can structure and organise knowledge better. The Web contains extensive information but unfortunately the knowledge content is inadequate. The professionals should have the good capacity to store, organise and analyse such sizeable quantities of information. The major issues being encountered are how to organise information which is available on the Web for easy retrieval as well as for making it an organised information so that it can lead to the knowledge generation. There is no denying the fact that the Web has increased the thirst for knowledge. “Knowledge Portals” and “Web-based interactive information resources” have value only when they contribute to the sharing of knowledge, be it within the human minds or organisations. The discussion groups on the Web are also being considered as effective tools for knowledge acquisition since the replies that one gets to the queries come from the people who live in the real world and have rich experience. We can have a better perspective of the problem through their inputs and they can help in the decision-making. The Web is also a good knowledge support tool as it enhances both managerial problem-solving as well as decision-making processes. It also gives rise to the new stimulating ideas and creative thinking. There is a growing need to have the “context-based searching” on the Web rather than only getting engaged with “keyword-based searching”. There is also a need to categorise the information which is available on the
Internet as it can result in its better utilisation. We notice, therefore, that the web-based acquisition of knowledge is instrumental in promoting lifelong learning processes. The question answering technology can enhance the quality of the knowledge acquisition on the Web. We will be discussing the QA technology in detail in Chapter 6. (8,9)

I would also like to mention here briefly that there are some software available which assists in the process of knowledge acquisition, its organisation and accessibility. A mention needs to be made of WINCITE Knowledge Management software which does a mapping of a wide range of resources. Herein the references downloaded from the World Wide Web into the local database or the information resident somewhere else can be mapped to specific topics and related subjects in the WINCITE knowledge-base. It then classifies these resources just the way we classify the documents in the libraries. (10) It also allows the creation of metadata for the knowledge base.

The survey results clearly indicates that only 12.9 percent of the libraries are engaged in developing integrated resource discovery systems. The University Libraries and Research/Special Institutions have a limited activity for undertaking this task.

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/Special (N=30)</th>
<th>Total (N=147)</th>
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<tr>
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<td>40 (88.9)</td>
<td>17 (77.3)</td>
<td>24 (80.0)</td>
<td>128 (87.1)</td>
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<tr>
<td>Yes</td>
<td>3 (6.0)</td>
<td>5 (11.1)</td>
<td>5 (22.7)</td>
<td>6 (20.0)</td>
<td>19 (12.9)</td>
</tr>
</tbody>
</table>

Chi-Square 5.47 Significant at .140 level Note: Figures in parentheses are the percentage
The survey results however indicates that 49.7 percent of the libraries have made the linkages to the free full-text resources on their websites. The libraries of the Institutes, Universities and Research/Special libraries are engaged with 57.8 percent, 63.6 percent and 43.3 percent respectively.

Table 7: Linkages Created by the Libraries with Free Full-text Resources

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
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<tbody>
<tr>
<td>No</td>
<td>30 (60.0)</td>
<td>19 (42.2)</td>
<td>8 (36.4)</td>
<td>17 (56.7)</td>
<td>74 (50.3)</td>
</tr>
<tr>
<td>Yes</td>
<td>20 (40.0)</td>
<td>26 (57.8)</td>
<td>14 (63.6)</td>
<td>13 (43.3)</td>
<td>73 (49.7)</td>
</tr>
</tbody>
</table>

Chi-Square 5.25 Significant at .154 level Note: Figures in parentheses are the percentage

2.5.1 Organisational Knowledge Acquisition

The knowledge acquisition research has clearly shown that knowledge is not easily transferable and is considered sticky at the source point (11) and also at the intended recipient end there is a need for the absorptive capacity (12)

The success of any organisation depends on the organisational knowledge, i.e. the sum total of the intellectual knowledge which is assimilated by and available within an organisation. The knowledge acquisition in organisations is an ongoing process since with each passing moment new knowledge gets created and becomes available to organisations. One of the most intricate questions for the organisations is how to acquire this knowledge. A tool named KMAP has been developed which is used to collect and
organise the data. It is a scriptable, multi-user concept mapping system, herein the various possible topics can be proposed anonymously by several groups simultaneously, then discussed freely by the group and being accepted only with the consensus of everyone in the group. Each user or the group interacts with one another through one large shared screen through a local computer which facilitates the process of assessing the ideas before they are sent to everyone. (13) The KMAP (Knowledge Maps) are developed using the data mining techniques, the topic maps are constructed which help in building the Knowledge Maps. They contribute to the recommendation systems and also to the decision support systems in the organisations.(14) Another tool for the acquisition of organisational knowledge is the KnowledgeGrid which operates through the World Wide Web and helps the distributed communities in collaborative knowledge acquisition activities. The Knowledge Grid is an intelligent and interconnected environment wherein the people and the systems can interact effectively to capture, publish, share and manage knowledge resources. (15) I would like to mention that the Indian Institute of Science, Bangalore has developed a prototype software for knowledge mapping.

Table 8: In-house Research Activity among the Institutions

<table>
<thead>
<tr>
<th>In-house Research Activity</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
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<td>Yes</td>
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<td>14</td>
<td>27</td>
<td>107</td>
</tr>
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<td></td>
<td>(66.0)</td>
<td>(73.3)</td>
<td>(63.6)</td>
<td>(90.0)</td>
<td>(72.8)</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>40</td>
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<tr>
<td></td>
<td>(34.0)</td>
<td>(26.7)</td>
<td>(36.4)</td>
<td>(10.0)</td>
<td>(27.2)</td>
</tr>
</tbody>
</table>

Chi-Square : 6.58

Significant at .08 level

Note : Figure in parentheses are the percentages.
In order to assess whether the surveyed institutions undertake the in-house research activities which generates knowledge, the question was posed to them. The results have shown that 90 per cent of the Research/Special institutions undertake the in-house research activities, followed by 73.3 per cent in Institutes, 63.6 per cent in Universities (certain departments in the Universities are engaged in the R&D work) and 66 per cent colleges undertakes the in-house research activity.

I have tried to evaluate the various services which are provided by the libraries for the in-house research activities. It has been found through the survey that 24.5 per cent of the libraries are able to meet the demands of the scholars engaged in in-house research activities by providing the information from their own library resources. While 23.1 per cent demands are met through the online resources subscribed by the libraries. It is further found that the support through the library networks is only 14.3 per cent. The CAS/SDI also contribute to 23.1 per cent, whereas the library’s support through personal interactions contributes to a meagre 2 per cent only.

Table 9: The Library’s Support to the In-house Research Activities

<table>
<thead>
<tr>
<th>Library’s Support</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing Local Library Resources</td>
<td>10 (20.0)</td>
<td>8 (17.8)</td>
<td>7 (31.8)</td>
<td>11 (36.7)</td>
<td>36 (24.5)</td>
</tr>
<tr>
<td>Through Online Resources Subscribed</td>
<td>10 (20.0)</td>
<td>14 (31.1)</td>
<td>4 (18.2)</td>
<td>6 (20.0)</td>
<td>34 (23.1)</td>
</tr>
<tr>
<td>Through Library Networks</td>
<td>6 (12.0)</td>
<td>9 (20.0)</td>
<td>3 (13.6)</td>
<td>3 (10.0)</td>
<td>21 (23.1)</td>
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<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Through Personal Interactions</td>
<td>1 (2.0)</td>
<td>2 (4.4)</td>
<td>-</td>
<td>-</td>
<td>3 (2.0)</td>
</tr>
<tr>
<td>Through CAS/SDI</td>
<td>8 (16.0)</td>
<td>13 (28.9)</td>
<td>4 (18.2)</td>
<td>9 (30.0)</td>
<td>34 (23.1)</td>
</tr>
<tr>
<td>Through Training in Using Online Services</td>
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<td>-</td>
<td>-</td>
<td>1 (0.7)</td>
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<td>Question not attempted</td>
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<td>10 (45.5)</td>
<td>9 (30.0)</td>
<td>54 (36.7)</td>
</tr>
</tbody>
</table>

Note: Multiple responses, percentages do not add to 100. Figures in parentheses are the percentage.

2.5.2 Knowledge Acquisition through the Libraries

All of us are aware of the fact that data provides a basis for most of our knowledge. The information which is available in the libraries is in the form of books, articles, grey materials and in order to transform this information into knowledge, knowledge has to be culled out from these resources with the help of the Knowledge Abstraction tools. The automated libraries, digital libraries and the information networks are running now successfully. They deliver timely information services to their users. There is thus, a greater need for devising mechanism for extraction of knowledge from the information resources which are available in databases housed in the libraries. The automated extraction and
summarization is one such technique wherein a concise description can be derived from a lengthy information base. Also it helps in deducing the relationships between the types of knowledge resources e.g. the information about the large whale population in the seas of Japan, and corresponding research on them in the laboratories of Japan has lead to the fact that whale meat is one of the most favourite ones liked by the Japanese population. Thus the abstraction of information becomes vital in the decision making and planning processes. However, each new knowledge resource needs to be validated. The knowledge thus acquired must sufficient utility and efficient representation for its better storage and accessibility. (16)

I wish to cite here the results of the survey through the following tables. It is quite astounding to know that the libraries are being distanced from the knowledge activities. The Knowledge Capture, Knowledge organization, its creation and transmission is still far away to reach the libraries in India and in the hands of the library and information science professionals. In the Research/Special Institutions, the trend is quite encouraging as more than 63.3 percent of the research/special libraries are engaged in knowledge capturing activities, with 50 percent of the surveyed Universities, 48.9 percent of the Institutes and 46.0 percent of the colleges are involved in the knowledge capturing activities.

**Table 10** : The Knowledge Capturing Activities Undertaken in Libraries

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/Special (N=30)</th>
<th>Total (N=147)</th>
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<tbody>
<tr>
<td>No</td>
<td>27 (54.0)</td>
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<tr>
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<td>22 (48.9)</td>
<td>11 (50.0)</td>
<td>19 (63.3)</td>
<td>75 (51.0)</td>
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</table>

Chi-Square 2.41 Significant at .490 level Note: Figures in parentheses are the percentage
The survey results clearly shows that 60.5 percent of the libraries are undertaking the tasks of knowledge organisation. The Research/Special libraries again are leading in this task with 70 per cent of their libraries are involved with the knowledge organisation activities, followed by 68.2 percent in Universities and 58 per cent in colleges and 53.3 percent in Institutes.

Table 11: The Knowledge Organisation Activities Undertaken in Libraries

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
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<tr>
<td>No</td>
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<td>15 (68.2)</td>
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</table>

Chi-Square 2.77 Significant at .427 level

Note: Figures in parentheses are the percentage

The survey results concerning the knowledge creation and knowledge transmission activities are highlighted in the following tables. 40.1 percent of the libraries are engrossed in knowledge creation activities while 61.2 percent of the libraries are undertaking the knowledge transmission tasks.
Table 12: The Knowledge Creation activities undertaken in Libraries

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>36 (72.0)</td>
<td>25 (55.6)</td>
<td>12 (54.5)</td>
<td>15 (50.0)</td>
<td>88 (59.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>14 (28.0)</td>
<td>20 (44.4)</td>
<td>10 (45.5)</td>
<td>15 (50.0)</td>
<td>59 (40.1)</td>
</tr>
</tbody>
</table>

Chi-Square 4.88 Significant at .18 level  Note: Figures in parentheses are the percentage

Table 13: The Knowledge Transmission Activities Undertaken in Libraries

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>20 (40.0)</td>
<td>20 (44.4)</td>
<td>8 (36.4)</td>
<td>9 (30.0)</td>
<td>57 (38.8)</td>
</tr>
<tr>
<td>Yes</td>
<td>30 (60.0)</td>
<td>25 (55.6)</td>
<td>14 (63.6)</td>
<td>21 (70.0)</td>
<td>90 (61.2)</td>
</tr>
</tbody>
</table>

Chi-Square 1.66 Significant at .644 level  Note: Figures in parentheses are the percentage

2.5.3 Knowledge Acquisition from Digital Libraries

The digital libraries have revolutionised the way information is received, processed, disseminated and archived in the libraries. A number of digital libraries have been developed and are available online. Some of the prominent ones include Universal Digital Library, Project Gutenberg, International Children’s Digital Library, etc. I have mentioned below some of the major Digital Library initiatives:
These digital libraries are considered the depositories of vast information. They can be useful in storing complex data which could also pertain to some of the difficult queries. The digital libraries which are being developed as of now support the keyword searching and browsing. It is very difficult and tedious at times to deduce the correct and relevant keywords to represent a specific topic of research which is queried by the end user. The relevance of the hit results is generally left to the user who evaluates the results. In order to cater to the needs of the knowledge seekers, it is quite important to devise the Digital Libraries which can mechanise the retrievability of the desired information. The newer digital libraries provide new avenues to collect, organise and access substantial amounts.
of information from the multiple repositories and the heterogeneous resources that are distributed across the network. The searchers who want to find information usually either do searching (i.e. they know exactly what they want to find) or do browse to find the resources that may interest them. It is therefore important to evaluate whether the current digital libraries help users in their problem-solving activities.

Through a survey conducted among the libraries, it has been found that only 32.7 percent of the libraries are involved with the digitisation of documents. A sizeable number of libraries have still not been able to initiate the tasks for building up the Digital Libraries. The issues concerning the knowledge acquisition through the digital libraries can be taken up once a sizeable number of libraries come forward to build a consortium of Digital Libraries that agree to the common standards and architecture which would be essential for designing ideal digital libraries. The knowledge acquisition processes would be facilitated as a result.

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>39 (78.0)</td>
<td>29 (64.4)</td>
<td>13 (59.1)</td>
<td>18 (60.0)</td>
<td>99 (67.3)</td>
</tr>
<tr>
<td>Yes</td>
<td>11 (22.0)</td>
<td>16 (35.6)</td>
<td>9 (40.9)</td>
<td>12 (40.0)</td>
<td>48 (32.7)</td>
</tr>
</tbody>
</table>

Chi-Square 4.17 Significant at .243 level Note: Figures in parentheses are the percentage

Before I proceed further, it will be appropriate to discuss the shortcomings in the current Digital Library systems which are listed below (17 and 18):
2.5.3.1 Non-Availability of the Strategic-Level Cognition Support:

The Digital Library systems allow the users to browse in order to search for the required information. They should also support strategic level cognitive work which can help users to solve problems. It has been found that those who already have prior domain specific knowledge, want to get some assistance to confirm or deny their existing beliefs. Herein it is not just simply the documents which will help them but the authoritative replies along with appropriate documentation methods on the subject. The users used to traditional information searching and browsing methods fall into the tactical level cognition act. The users who want high order cognition answers are categorised as forming part of the strategic level cognition act. The Digital Libraries have to help users to derive effective results and also to automate the DL’s response system by maintaining data sources in diverse forms such as textual articles, reports, databases, etc.

The traditional searching and browsing of the Digital Library for information is a tactical level cognitive acts wherein the specific information is being searched. For example, a user searching for articles written by the author M. D. Cox in IEEE Transactions on Power Delivery, as the information required is too specific, it is quite easy to retrieve the desired information. The browsing helps the users to navigate through the correlated items and then to attain the desired documents. In order to facilitate the browsing, the Digital Libraries must integrate the various repositories to provide the end users with a uniform searching and retrieval to a large collection of materials. In case of the strategic level cognition level support, the Digital Libraries not only provide the users with the requested documents but also provide the intelligent, expert answers to high-order cognitive questions with proper justifications and explanations.

2.5.3.2 Insufficient Knowledge Sharing Facilities

There is no denying the fact that the traditional libraries are the social hubs where
people from different communities can interact with each other and gain knowledge. They also approach the library staff periodically with their queries and get better acquainted with the usage of the library resources. There is considerable mutual sharing and knowledge sharing which occurs in the process. Since the print resources are being digitised and the physical libraries are moving onto the virtual Digital Libraries, the valuable features of the physical libraries should not be eliminated. The Digital Libraries may not merely act as information storage and retrieval systems. They must be developed and designed as knowledge repositories where knowledge acquisition, sharing and propagation takes place constantly. The Digital Libraries must have adequate expertise available with them. They should be able to offer knowledge repositories to users around the world.

Several models for developing digital libraries have been tried. A two-layered Digital Library functional model was proposed by Ling Feng, Manfred A. Jeusfeld and Jeroen Hoppenbrouwers in order to cater to both the tactical level and strategic level cognitive tasks of users depending on their information needs. This model does not allow all the simple searching and browsing of information which lie scattered across multiple heterogeneous repositories. In this model, the Digital Library Information space gets divided into Knowledge Subspace and the Document Subspace. The documents which constitute a part of the Document Subspace justifies the corresponding knowledge in the knowledge subspace. The Digital Libraries are not merely to act as the Information providers but also have to act as the Information and Knowledge provider. The current research is moving in this direction. In these Digital Libraries, a two layered functional model is being suggested: A Tactical Level and a Strategic Level Cognition Support.

### 2.5.3.3 Human-Centred Knowledge Acquisition

The main trouble in a Digital Library to acquire data is how to extract knowledge from the symbolic data. The computer systems are unable to extract the knowledge from
the data. While making the searches on the Web, the strategic intention of the end user seeking knowledge can never be demonstrated. (20).

2.5.3.4 Machine-Centred Knowledge Acquisition

As more and more information is now available in the digital format, there is a need for the automatic and user-assisted/semi-automatic extraction of inherent knowledge from an extensive volume of data. There are mainly six steps which are involved in the process of machine-centred knowledge discovery across various repositories in the Digital Libraries (21). They are:

1. To setup knowledge discovery targets;
2. To identify the relevant resources;
3. To filter out the interesting concepts from the identified resources;
4. To correlate concepts according to the contextual information;
5. Extract knowledge and justifications from the correlated concepts; and
6. Evaluate the discovered knowledge with justifications.

2.6 Knowledge Acquisition Strategies

It is essential for the libraries to evolve strategies for knowledge acquisition in consultation with the management of their institutions. I have broadly highlighted some of the strategies which should be adopted for knowledge acquisition purposes in the libraries (22):

1. In the organisations which are served by the libraries, the knowledge is available with the faculty members, research scholars, R&D team members, besides their availability in the form of printed and non-printed materials like books, journals, articles, theses and dissertations, reports, case studies, etc. There should be a Decision Support System developed in each institution and maintained by the library.
It should be made compulsory to have the mandatory disclosure of one’s knowledge tapped in any form to become a part of the Decision support systems. The individual heads of the departments of the Universities, Colleges, R&D organisations should be responsible for collecting the relevant material and then should pass it on to the library for creating a knowledge-base. The Committees could be constituted in the institutions that would oversee the content being tapped for knowledge acquisition purposes.

2. The Knowledge Repositories should be maintained and there should be frequent updations to them. Such repositories should be made accessible across diverse user groups.

3. A strategy should be devised to tap the human knowledge which is available with the domain experts, faculties, etc in the organisations. The Knowledge Experts from the organisations or from outside could be approached and the Expert Knowledge Bank could be created in the specialised areas and disciplines in the organisation.

4. Also the talks, discussions, lectures, etc could become a part of the knowledge-base wherein the knowledge could be transferred and acquired at any given point of time.

5. There are several tools which have been developed to support the Organisational Knowledge Acquisition including Concept Maps, Repertory Grids, Semantic Networks, etc. They have been discussed in Chapter 6 “Knowledge Networking: Tools, Technology and Delivery”.

6. The Knowledge Acquisition strategies could also be divided into:

   a. Codification and
   b. Personalisation
In Codification Strategy the information and knowledge is codified and stored in databases and can be used at any time by the users. It is meant for future use. However, in Personalisation Strategy human beings are encouraged to transfer their knowledge. This knowledge, however, does not get stored as the linking between people-to-people becomes difficult if not well organised. Instead, linking between the users and the documents is proved to be possible.

I would like to mention here the strategies used by the MNCs, consulting organisations in order to tap knowledge. (23)

<table>
<thead>
<tr>
<th>Codification</th>
<th>Personalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide high quality, reliable and quick information systems implementation by reusing codified knowledge.</td>
<td>Provide creative, analytically rigorous advice on high level strategic problems by channeling individual expertise.</td>
</tr>
<tr>
<td>People-to-documents.</td>
<td>Person-to-Person : It develops networks for linking people in order to ensure that the tacit knowledge can be shared.</td>
</tr>
<tr>
<td>It develops an electronic document system that codifies, stores, disseminates and allows reuse of knowledge</td>
<td></td>
</tr>
<tr>
<td>Anderson Consulting, Ernest and Young</td>
<td>McKinsey and Company, Bain and Company</td>
</tr>
</tbody>
</table>

2.7 New Roles for LIS Professionals

Since knowledge has become a determining factor for the economic wealth of nations and is equally felt in the organisations, the LIS professionals have to come forward and handle knowledge in their organisations, universities, colleges, R&D organisations, wherever they are employed. The society is now more conscious of their information and knowledge needs and therefore their demands for knowledge are increasing every day.
To manage this, the library professionals will have to get involved with the knowledge innovation processes in the libraries. To be more effective, they must have adequate skills and technology know-how to tap the tacit and explicit knowledge. The libraries can no longer be only the passive repositories of books and other printed materials. They have to store knowledge which is available in different forms. The library professionals have to learn the use of new knowledge tools and technologies for undertaking various knowledge activities and for creating online content for users. The Knowledge Intensive Organisations have now appointed the Chief Knowledge Officers (CKO) who are assigned the tasks for managing knowledge.

A survey was conducted among the institutions. It is observed that there is a greater interest among the institutions for providing adequate training to their manpower for handling the knowledge creation tools and techniques. One hundred per cent of the University respondents have expressed the need for the training, followed by 86 per cent colleges, 84.4 per cent Institutions and 76.7 per cent research/special institutions.

Table 16: Need for Training of the LIS Professionals in Knowledge Creation

<table>
<thead>
<tr>
<th>Need for Training</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>7 (14.0)</td>
<td>7 (15.6)</td>
<td>-</td>
<td>7 (23.3)</td>
<td>21 (14.3)</td>
</tr>
<tr>
<td>Yes</td>
<td>43 (86.0)</td>
<td>38 (84.4)</td>
<td>22 (100.0)</td>
<td>23 (76.7)</td>
<td>126 (85.7)</td>
</tr>
</tbody>
</table>

Chi-Square 5.73

Note: Figures in parentheses are the percentages

Significant at .12 level
However, through the survey I have tried to assess the problems which are encountered in getting them trained for handling the knowledge creation tools and techniques. 15.6 percent of the respondents expressed that there is a lack of elementary knowledge of computers and IT skills among the professionals to get trained. 11.6 percent of the respondents feel that due to the non availability of the adequate manpower in the libraries, they could not depute their library professionals for the training while 10.9 percent were of the opinion the lack of organisation of good training programmes.

Table 17: Problems Encountered in Getting the LIS Professionals Trained for Handling Knowledge Tools

<table>
<thead>
<tr>
<th>Problem</th>
<th>Colleges (N=50)</th>
<th>Institutes (N=45)</th>
<th>Universities (N=22)</th>
<th>Research/ Special (N=30)</th>
<th>Total (N=147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of management's interest</td>
<td>-</td>
<td>5 (11.1)</td>
<td>3 (13.6)</td>
<td>-</td>
<td>8 (5.4)</td>
</tr>
<tr>
<td>Lack of interest among the professionals</td>
<td>3 (6.0)</td>
<td>2 (4.4)</td>
<td>2 (9.1)</td>
<td>3 (10.0)</td>
<td>10 (6.8)</td>
</tr>
<tr>
<td>Time constraint</td>
<td>-</td>
<td>3 (6.7)</td>
<td>1 (4.5)</td>
<td>-</td>
<td>4 (2.7)</td>
</tr>
<tr>
<td>Lack of availability of good training programs</td>
<td>4 (8.0)</td>
<td>5 (11.1)</td>
<td>4 (18.2)</td>
<td>3 (10.0)</td>
<td>16 (10.9)</td>
</tr>
<tr>
<td>Lack of elementary knowledge of computers</td>
<td>10 (20.0)</td>
<td>4 (8.9)</td>
<td>4 (18.2)</td>
<td>5 (16.7)</td>
<td>23 (15.6)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Shortage of manpower</td>
<td>5 (10.0)</td>
<td>4 (8.9)</td>
<td>4 (18.2)</td>
<td>4 (13.3)</td>
<td>17 (11.6)</td>
</tr>
<tr>
<td>Lack of availability of funds</td>
<td>2 (4.0)</td>
<td>1 (2.2)</td>
<td>4 (18.2)</td>
<td></td>
<td>7 (4.8)</td>
</tr>
<tr>
<td>Distance with the venue</td>
<td>2 (4.0)</td>
<td>4 (8.9)</td>
<td></td>
<td></td>
<td>6 (4.1)</td>
</tr>
<tr>
<td>Poor infrastructure</td>
<td></td>
<td>1 (2.2)</td>
<td></td>
<td></td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Language barrier</td>
<td>1 (2.0)</td>
<td></td>
<td></td>
<td></td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Not attempted</td>
<td>24 (48.0)</td>
<td>19 (42.2)</td>
<td>5 (22.7)</td>
<td>16 (53.3)</td>
<td>64 (43.5)</td>
</tr>
</tbody>
</table>

Note: Multiple responses, percentages do not add to 100.

Figures in parentheses are the percentages.

There is also a need for introducing knowledge engineering in the libraries. The library and information science professionals should work as knowledge engineers and should mediate between the expert and knowledge base, derive knowledge from the experts and then encoding this knowledge for the knowledge base, refine it further in consul-
tation with the expert so that it can be disseminated easily to the users. There is a problem in the availability of the knowledge engineers and also, they are not trained to undertake the tasks of the intermediaries. (27) This has led to the development of interactive knowledge acquisition and encoding tools allowing the subject experts to transfer the knowledge directly to the knowledge-based systems without the intermediaries. (28). The knowledge engineers should:

1. Advise the knowledge experts on the processes of interactive knowledge elicitation;
2. Be familiar with handling the knowledge acquisition tools and know-how to set them up properly;
3. Edit the uncoded knowledge base in consultation with the experts;
4. Validate the application of knowledge base;
5. Impart training to the end users in the effective use of the knowledge base in consultation with the experts and should develop operational procedures;
6. Work with subject specialists.

2.8 Conclusion

The Knowledge Acquisition is a building block of the knowledge-based systems. It enables the process of knowledge creation, organisation, sharing and distribution of knowledge. It has been found that there are major hurdles in acquiring knowledge which relate to many attributes of knowledge, its availability in various forms, through various mediums, etc. The present-day library professionals have to master the use of several tools and techniques in order to facilitate the process of knowledge acquisition. Moreover, the Digital Library developers and the policy makers must think hard to provide the strategic level support in their fully digitized documents. The mere searching and browsing facilities are not sufficient enough to meet the knowledge needs of the users. There is a need for clear cut laid down policies and strategies for the knowledge acquisition processes.
References


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21 Ling Feng, op. cit., p. 111.


