CHAPTER 9

CONCEPTION OF PUNE MANAGEMENT LIBRARY NETWORK (PMLN)

9.1 Prologue:

Opening part of the thesis presented the very need of the library network which was substantiated in the later chapters. The sole objective of the research work was to seek the readiness of the management institutes in Pune towards formation of a library network wherein the individual libraries now serving a rich hub of information and knowledge based services can gain collective advantages and which in turn would be attained by their stakeholders. Based on the findings as regards to the technical capabilities of the libraries of management institutes in Pune a model of Pune Management Library Network referred hereafter as PMLN has been conceived and presented in this chapter.

Figure 9.1 shows the geographical spread of the PMLN. It consists of three districts viz. Pune, Nashik and Ahmednagar. The PMLN will reach to the management institutes through three sub-networks connecting 204 institutes from Pune, 27 institutes from Ahmednagar and 34 institutes from Nashik. List of these institutes along with their addresses is available at


The main vision of PMLN is to unite the above mentioned libraries, to facilitate them to accomplish what cannot be done by the standalone library. Networking will support them to exploit their inadequate resources and will make out their cooperative strong points so as to tie together in a win-win fashion. The integrated functionality of PMLN goes on the following lines:

- Assisting combined acquisition of print resources
- Judicious allocation of e-resources
- Lend an expert hand in dispensation of information resources
- One time downloading of the freeware, shareware and Open Education Resources available on web for all the users of the member institutes.
- Developing a uniform acquisition policy to avoid redundant and extravagant duplication in procuring the resources.
- Developing information robots through browser utilities for metadata harvesting
- Developing a user friendly interface for information retrieval.
- Narrowing the demand-supply resource gap by characterizing the information seeking behavior of the users from the member institutes.
- Archiving the e-resources for their sustained use.
- Efficiently implement the inter-library loan modalities amongst the member institutes.

Before proceeding to the details of the PMLN model, however it would be worthwhile to review the nitty-gritty’s of the modeling notion.

9.2 Basics of modeling

Model is a small object used to build scale, representation and primary work is of developing a plan for the development of network. Model is useful for plan, construction and creates a basic idea of work (Business dictionary). The basic objectives of models are:

i. To facilitate understanding by eliminating unnecessary components
ii. To aid in decision making by simulating 'what if' scenarios
iii. To explain, control, and predict events on the basis of past observations and future needs

A model contains only those features that are of primary importance to and ranges from simple sketches to computer programs with millions of lines of code, but all of them have one thing in common: some elements of the actual 'thing' are abstracted or mapped into the model.

Models are divided into three classes on the basis of their degree of abstraction:

i. Iconic Model: least abstract, physical, 'look-alike' model, such as a model airplane or train.
Figure 9.1 Geographical spread of the PMLN showing three subnets viz. Pune, Nashik and Ahmednagar
ii. Analogous Model: more abstract but having some resemblance to what it represents, such as a chart, graph, map and network diagram

iii. Symbolic Model: most-abstract model with no resemblance but only an approximation to what it represents, such as a mathematical equation or formula, financial statement, language, and set of accounts.

The scholarly literature if full of different concepts related to model. However according to Oxford Dictionary, the necessary model of suits to a present study is model is a three-dimensional representation of a thing, typically on a smaller scale. Model is (in sculpture) a figure made in clay or wax which is then reproduced in a more durable material. Model is something used as an example. Model is a simplified mathematical description of a system or process, used to assist calculations and predictions. Model is an excellent example of a quality.

“A representation of a system that allows for investigation of the properties of the system and, in some cases, prediction of future outcomes. Models are often used in quantitative analysis and technical analysis and sometimes also used in fundamental analysis” (investor-words). “Model is graphical, mathematical (symbolic), physical, or verbal representation or simplified version of a concept, phenomenon, relationship, structure, system, or an aspect of the real world” (Business dictionary). “A model can represent in many shapes, sizes, and styles. It is important to emphasize that a model is not the real world but merely a human construct to help us better understand real world systems. In general all models have an information input, an information processor, and an output of expected results” (Carleton)

9.3 Architecture of PMLN

The very notion of the PMLN has been originated in view of the recent initiatives adopted by the management institutes affiliated to the Savitribai Phule Pune University. The same has been perceived by the researcher through the questionnaire addressed to the librarians of these institutes. Factors in support of formation of the PMLN are as follows:
Library Automation Drive by almost all the institutes
- Presence of the library on the respective institute’s website
- Digital Library Initiatives
- Resource Mobilization through Turnkey Projects
- Library Networking

The PMLN will have three subnets viz. Pune, Ahmednagar and Nashik. One of the possible topology for the Pune subnet is as shown in figure 9.2. The other subnets will be worked out on the similar lines as shown in figure 9.2. The server technically stringent enough for catering the needs of the number of management institutes falling under the respective district will be chosen.

The central server of the PMLN will be configured as a Data Center with a standard blade server solution from reputed companies such as IBM, HP, SAN with storage capacity of approximately 32TB and the visualization software VM Ware. Other civil amenities for such a data center include precision air conditioners, uninterrupted power supply, diesel generator, and fire alarm and IP cameras for surveillance.

The main advantage of such a sophisticated data center would be to converge all the servers on a single platform which will also save significantly on the maintenance account. The entire scattered infrastructure could be thus unified on a single platform. The above mentioned infrastructure will have the following typical specifications which will be scale as the more management institutes are added to the PMLN.

**Features of the Data Centre:**

- IBM H Blade Chassis with 14 blade slots, populated with 10 No. of IBM HS22 Blade Servers, Intel Xeon Hex-Core CPU, RAM 4GB, onboard 146 GB SAS HDD
- Storage: IBM SAN Storage 9 TB Fiber Channel HDDs with 2TB free space
- Level III data centre having 99.99 % up time

The above specifications are chosen from IBM. However they are simply to give an insight regarding the specifications. Similar other companies such as IBM, CISCO can be opted to accomplish the network.
Other essential part of the network is the equipments required for the networking purpose. A set of typical specifications goes on the following lines:

**Network Equipment**

- HP Make Multiservice Router, Watch Guard Make UTMs and HP Make Core Switch
- Virtualization software: VM Ware 5.1 virtualization Solution for hosting virtualized servers with platforms like Windows 2003, 2008, Linux

In addition to above few peripheral equipments re required in order to safe guard the central data center. Following list details additional equipments for this purpose:

**Peripheral Equipments**

- Precision Air Conditioners
- On line UPS
- DG set
- Raised flooring and false ceiling
- IP Camera for Surveillance
- Fire proof glass doors with Biometric Access Control
- Fire Alarm System
- Rodent Repellant System
Figure 9.2 Topology for the Pune Subnet
Essentially the PMLN will be distributed network with shared functionalities as shown in figure 9.3.

![Figure 9.3 Distributed Nature of the PMLN](image)

As shown in figure 9.3, the central data center will suffice all the infrastructural requirements of the network. The member libraries will have to invest very little in terms of the computing resources. Even the vast amount of storage modalities will be taken care by the Central Storage Area Network (SAN).

### 9.4. Designing PMLN: A Layered Approach

The design and deployment of the PMLN has been carried out in a layered manner as shown in figure 9.4. There are three basic layers through which this network will manage its functioning namely:

- Access Layer
- Content Layer
- Storage Layer
Details of these layers are as follows:

**9.4.1 Access Layer**

The access layer will manage the common search / exposure services. The search window will facilitate the search in an intuitive manner. There will be provision to fire the search query in the natural language manner. In addition to this the Boolean combinations will be allowed to mine the proper information from the repository. The individual management institute libraries will have their library union catalogs which will be shared through the access layer. The access layer will present the information through the digital library portal which will be sort of integrated library system facilitating the system integration through software services. The system will also facilitate digital object catalog system for approving / denying the access to the resources. In addition to this the access layer will have personalization options in order to remember the search preferences of the respective library/ users.

Following means will be provided to facilitate the access to the resources:
• **Joint OPAC**

OPAC (Online Public Access Catalogue) will be made available to get the bibliographical details of the collection. Searching tools such as simple search, advanced search, search by database, ISBN will be deployed under OPAC facility. The search results will be presented with tags of the respective management institute library along with additional information as regards to the exact location of the resource in the respective library. Information regarding the resource availability at the time of searching will also help the users to know well in advance as regards to its presence in the library.

• **Electronic Resource Management package for e-journals**

The portal of PMLN will host several e-resource packages to access peer-reviewed e-journals, e-books, e-database (bibliographical and full text...etc) and portal. Some of them will be: Cambridge University Press, Sage, Science Direct, Springer Link, JCCC, ASME, ASCE, LISA, Scopus and Web of Science. These e-resources are either accessible from INFLIBNET Centre (an IUC centre of UGC) or subscribed to the library and link to all such e-resources/portal made from the library website. In addition to that, link to scholarly open access journals/database will also be provided through the library website.

• **Federated searching tools to search articles in multiple databases**

The library portal will feature access to e-database/portals like JCCC, Scopus, SciFinder Scholar, Knimbus and LISA having federated searching facility from multiple databases. The search strategy includes Boolean Logic searching options/logical searching options and advanced searching techniques to access the particular document.

9.4.2 **Content Layer**

The content layer will feature many standard types of content categories as detailed below:

• Article repository: This will host the collection of the articles freely available on the internet. Since the management students, faculty and researchers require case studies
which are available freely on the internet, the same will be collected at a common place and disseminated through this repository.

- **Publication repository:** The publication repository will host the publications of the faculty of the member management institutes. In order to avoid the copyright violation, the preprints will be hosted. This will serve the purpose of formation of close groups of likeminded faculty members aligning them to work on common themes. Simultaneously it will also increase the citations of the faculty members.

- **Thesis/ Dissertation and Projects:** Management schools are very rich in terms of the student projects. The main intent of this sub layer would be to collect such projects and showcase the potentials of the individual students and faculty members to the corporate sector. This will help in matching the interests of the students with the employees and help in improving the placement of the students. The faculty members are likely to get good consultancy project as their thesis and dissertations will be seen by the industry experts.

- **OA Publishing:** The scholarly publishing movement at no cost for readers mostly through online mode is picking up rapidly all over the globe and in most of the disciplines and management sciences is not an exception to this. The tools, media and journals for open access publishing will be showcased through this layer.

- **Books and Serials:** Free e-books, subscribed e-books would be made available to the member libraries.

- **Question papers and syllabi:** Student find great deal of difficulties when it comes to finding out the old question papers. With the rapid obsolescence of the concepts, the management science curriculum also goes on revising. The latest updated as well as old versions of the syllabi will be maintained through this layer.

### 9.4.3 PMLN Common Repository:

This repository will consist of the common tools, codes and software required by the users of the library. Useful tools for writing the reports, common templates for the dissertations and automated bibliography will find their place in this layer.
9.5 Connectivity of PMLN with other Library Networks:

In order to have value addition, the PMLN will be connected to other library networks as shown in figure 9.5.

Following library networks will be contacted for their possible connectivity with the PMLN:

1. Bombay Library Network BONET (BOSALA)
2. Information and Library Network (INFLIBNET)
3. Pune Library Network (PUNENET)
4. Calcutta Library Network (CALIBNET)
5. Madras Library Network (MALIBNET)
6. Ahmadabad Library Network (ADINET)
7. Mysore Library Network (MYLBNET)
8. Bangalore University Academic Library Network (BALNET)
9. Delhi Library Network (DELNET)
10. Management Library Network (MANLIBNET)
11. National Open and Distance Learner’s Library and Information Network (NODLIBNET)
12. Indore Library Network (INDOLIBNET)

9.6 Channel Partner for PMLN:

Choosing the right channel partner or in other words the Internet Service Provider (ISP) for the PMLN is very important for it success. An online tool hosted at opensignal.com helps in comparing the coverage of the various telecom service providers. This tool has been used with respect to the three districts proposed to be covered by the PMLN. The results are shown in figure 9.6.
Figure 9.5 Connectivity of PMLN to other Library Networks
Figure 9.6 Coverage Scenarios of the Various Telecom Operators in the PMLN
In view of the coverage depth and breadth of the BSNL the same is the natural choice for the PMLN. Besides the BSNL is also serving as the nodal implementation agency for the National Knowledge Connectivity (NKN) and owns most of the fiber spread over the region of coverage of the PMLN. Network prototyping after adapting to the BSNL facilities is as shown in figure 9.7.

![Network Prototyping Diagram](image)

**Figure 9.7 Network Prototyping**

The wide bandwidth indicated in figure 9.7 will facilitate multimedia type content to the library users. The convergence of the PMLN with BSNL can be best described by means of figures 9.8 and 9.9.
Figure 9.8 Proposed PMLN-BSNL Convergence Covering Pune University Management Institute Libraries
Figure 9.9 PMLN Connectivity through Static IP Backbone
Figure 9.10 PMLN Connectivity using IP over SONET
9.7 Closing View of the PMLN

The concluding view of the PMLN is shown in figure 9.11. The symbols used for this drawing are taken from CISCO documentation for ensuring standardization. The notable features of this network are as detailed below:

9.7.1 Network with core fiber connectivity:

The PMLN has a central fiber link running through the three districts which ensures no bandwidth limitation. In fact this serves as a sort of intranet amongst the institutes and thus facilitates the information exchange practically at no cost involvement.

9.7.2 Diversified End User Appliances:

The network exemplifies diversified end user appliances for information seeking. It ranges from the simple PC to LAN and even thin clients for cost effectiveness. It also takes care of the new computing devices such as tabs, iPods and mobiles.

9.7.3 Network with heterogeneous interfaces:

PMLN ultimately emerges with the network with heterogeneous networking interfaces. This includes simple modem to router, gateway, and Layer 3 switch.

9.7.4 Security:

As seen from the figure 9.11, PMLN ensures utmost safety from the attacks and thus exhibits minimal vulnerability. It has all sorts of firewalls, antispam appliances and the central antivirus solutions.

9.7.5 Protocols:

At the network level PMLN follows the standard TCP/IP protocols and the wireless protocol suite such as 802.11. However at the local level it also ensure the common standard data formats such as MARK 21 and metadata harvesting protocols such as Z39.5 used in the library realms.

User benefits of PMLN are listed out in the summary section.
Figure 9.11 Concluding View of PMLN
9.8 Costing of the PMLN:

As far as the possible realization of the PMLN is concerned, there are two approaches towards its implementation. Approach 1 could be procuring all the networking equipments and hosting them in the form of data center. This however could be the costly affair in the beginning. Instead of going for the same, it is possible to hire the third party services from various domains and then building the corpus fund for the sustenance of the PMLN. The second approach thus requires hiring various services from the third party service providers. The same is detailed below:

1. **Opting for co-location services of the Internet Service Providers:**

   Internet service providers such as BSNL provide Internet services to the customers located in about 450 locations. Web Co-location is an easy and cost effective solution to house the powerful infrastructure without losing the administrative control on the equipments. Web Co-location eliminates much of the Infrastructure costs as well as the maintenance cost of such equipments apart from avoiding the last mile problems. Web Co-location enables customer's equipment/ Servers to be treated as a part and parcel of the ISP network enjoying all the facilities as the ISP servers. Web Co-location provides the infrastructure at a nominal value keeping the customer comfortable and focused in maintaining the Applications /Services of the company.

   A Co-location is a data center facility in which an organization, can rent space for servers and other computing hardware. Co-location provides the building, cooling, power, bandwidth and physical security while the customer provides servers and storage. It manages services which supports the customer’s initiatives.

   Co-locate libraries can find themselves locked into long-term contracts, which may prevent them from re-negotiating rates when prices falls. It is important for an organization to closely examine their co-location's service level agreements (SLAs) so as not to be surprised by hidden charges.

   All terms and conditions are to be mention in agreement.

**Benefits of co-locator are:**

- Offer the libraries secure place for hardware, software and other equipments in their offices and warehouse.
- Provide security from fire, theft or damage.
• Provide higher security like cameras, fire detection and extinguishing devices.
• Provide higher facilities backup power generators, filtered power, multiple connections feeds etc.
• Co-location sites are being operate at various points around the world
• Provide services to the rapidly expanding Web hosting and e-commerce marketplace.
• One of the biggest benefits of co-location is it save the money.
• Implementing our own redundancy plan can be very costly and hard to manage. Co-location provides power redundancy.
• Co-location sites offer a variety of security services to ensure data is always safe and sound.
• From key card entry and 24/7 staffing to cabinet locks and surveillance cameras, your resources are protected in many ways at a co-location facility.
• This type of security and protection is difficult to manage with an in-house data center because of costs and staffing shortages.
• For security Co-location sites provides firewalls and intrusion detection services.
• Information is safe from intruders and data breaches in co-location sites.
• Co-location facility offers much more reliable network and connection than a typical in-house data center.
• Co-location sites have redundant internet services which helps network to switch over seamlessly if an issue or connection problem arises.
• These sites are supported by 24/7.
• Provide fast connection, download speed, fast connectivity and better performance.
• Data is always change and updated, but in in-house data center it is possible but it takes a lot of time. Data care center take care of that.
• Experts are available in co-location data centers, helps to solve the customer’s query, handle their problems. Because experts are monitor data center for 24/7.

In starting it takes money for all database creation and setup. But after that every management institute pay only small amount according to plan shows in table 9.1.
Apart from enjoying the bandwidth and facilities, the customer retains control over his equipment, software and operating system. The customer simply leases the physical space and high-grade, tier one network access from BSNL the hosting provider.

Software Technology Parks of India (STPI) is a government agency in India, established in 1991 under the Ministry of Communications and Information Technology. STPI manages the Software Technology Park scheme. It is an export oriented scheme for the development and export of computer software, including export of professional services. The STP Scheme provides various benefits to the registered units, which include 100% foreign equity, tax incentives, duty-free import, duty-free indigenous procurement, CST reimbursement, DTA entitlement, deemed export etc. Headquarter of STPI is in New Delhi.

In cities like Pune in addition to BSNL, Software Technology Parks of India (STPI) is yet another service provider to offer such services. The main advantage of the connectivity is its manageable features based on load. The exact tariff depends on the data exchange rate and this goes as per the following table in case of BSNL:

**Table 9.1 Costing for PMLN**

<table>
<thead>
<tr>
<th>Component Name</th>
<th>Plan I</th>
<th>Plan II</th>
<th>Plan III</th>
<th>Plan IV</th>
<th>Plan V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Tariff (in Rs)</td>
<td>4000.00</td>
<td>5000.00</td>
<td>7000.00</td>
<td>12000.00</td>
<td>20000.00</td>
</tr>
<tr>
<td>Free Data transfer per month</td>
<td>50 GB</td>
<td>100 GB</td>
<td>200 GB</td>
<td>500 GB</td>
<td>1000 GB</td>
</tr>
<tr>
<td>Email IDs of BSNL domain</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Additional data transfer charges per GB(Rs.)</td>
<td>100.00</td>
<td>80.00</td>
<td>50.00</td>
<td>40.00</td>
<td>30.00</td>
</tr>
</tbody>
</table>
2. **Opting for services of National Knowledge Network**

National Knowledge Network is yet another opportunity to avail the connectivity benefits. Just recently they have announced a major upgradation of their connectivity to educational institutes in the range of 1 to 100 GBPS. However the main limitation is the service could be availed only if the institute is permanently affiliated i.e. comes under 2F, 12B clause of the UGC. However a special case can be submitted for knowledge sharing.

The costing indicates that if the individual institute bears a fixed cost of the order of Rs. 50,000/- the entire PMLN would start rolling its operation. However this requires a critical mass and many institutes should be sensitized to become its members.

The intention of furnishing cost analysis is just to imply that the PMLN can sustain in a long run and there won't be any burden on the individual institutes. Secondly there is no need to have physical space or sort of office/data center for the said implementation.

This is very much significant as now a day’s any IT based project can be operationalised virtually without the constraint of space, time and so on.

**Summary:**

The main benefits of the PMLN are as listed below:

- Access to the union catalogue
- Access to one or more external databases
- Downloading metadata or the full text of the records.
- Requesting acquisition of new publications from their library itself on interlibrary loan.
- Access to their circulation records through the internet
- Accessing electronic journals across all the libraries in the network.

The said network is portrayed as the outcome of the present research work and will serve as the pilot project to connect management institutes in Pune. This will also enable concession in tariff for the academic purpose. The funding possibility for the said network can be explored through MHRD, Department of Information Technology and National Knowledge Commission.