CHAPTER-V

FINDINGS, RECOMMENDATIONS
AND CONCLUSION
This chapter contains summary of findings of the study including the results of hypotheses testing, suggestions emerging out of the present study, and further areas of research. Though the main findings have emerged out of the study, some of the points were also taken from the literature review, particularly those which coincide with the outcome of the study. Findings have been grouped into two parts.

Part-I First part of the chapter provides findings of the evaluation of the websites by the researcher. Findings are further broadly classified under seven sub headings.

Part-II Second part of the chapter provides findings of the evaluation of websites based on users’ feedback. Findings are further broadly classified under eight sub headings.

In light of the observations of the present study a strategic model for R&D library websites has been suggested and areas for further research are outlined.

5.1. Major observations of the study (Evaluation by the researcher)

Authority or GOI Identifiers:

- Around 90 percent of the websites of all the disciplines have used national logo on their homepages and provided the details of the sponsor of the website as GOI.
- Majority of the websites of Natural and Applied Sciences (92.98%), Medical (87.50%) and Agriculture have provided link to national portal, while all of the websites of Social Sciences (100%) have provided the same.
- Copy right year has been mentioned on homepages of the websites of Agriculture (89.36%), Natural and Applied Sciences (85.96%) and Medical
(79.17%), while the percentage of websites that have provided copy right are relatively less in Social Sciences (75%).

❖ Majority of the websites in Agriculture (72.34%) have used proper domain, followed by Natural and Applied Sciences (64.91%) and Medical (37.50%). However, the percentage of websites that have used proper domain names is less in Social Sciences (25%).

Links used:
❖ Number of internal links provided by the websites of Agriculture (63.83%), Medical (54.16%) and Natural and Applied Sciences (70.17%), range between 1 to 25 and 26 to 50, while the range is 76 and above for Social Sciences (50%).
❖ Number of external links provided by the websites of Agriculture (82.98%), Medical (70.83%) and Natural and Applied Sciences (84.21%) is in the range of 1 to 25 and 26 to 50. However, number of external links provided on the Social Sciences websites is equally distributed between all four groups (25 percent each).
❖ Number of dead links found on the websites of Agriculture (78.72%), Natural and Applied Sciences (77.19%) and Social Sciences (75%) is in the range of 1 to 25, while in the case of Medical websites it is 58.33 percent.
❖ Performance of the links has been rated between very good and excellent, for around 75 percent of the websites of all the disciplines.

Scope and Quality of the Content:
❖ Background information provided on the library websites of Medical (64.83%), Agriculture (57.45%) and Natural and Applied Sciences (56.14%) have been rated between very good and excellent. However, percentage of websites rated in the same range is slightly less in Social Sciences (50%).
❖ There is a significant difference in the details of the services provided on library websites of different disciplines, with a rating between good to
very good being high in Social Sciences (100%) and Agriculture (76.6%), while percentage being relatively low in the other two disciplines i.e. Medical (29.17%) and Natural and Applied Sciences (52.63%).

- Provision for feedback provided on the library websites of Agriculture (51.06%), Medical (54.17%) and Natural and Applied Sciences (64.92%) have been rated between average and good. While, 75 percent of the websites from Social Sciences have been rated as good for the same feature.

- Help section provided on the library websites of Agriculture (55.32%), Medical (50%) and Social Sciences (75%) have been rated between good and very good. While, around half of the websites from Natural and Applied Sciences (52.63%) have been rated between very good and excellent.

- Readability of more than two-thirds of the websites of Agriculture (65.96%), Medical (70.83%) and Social Sciences (75%) have been rated between very good and excellent. While, 70.18 percent of the websites from Natural and Applied Sciences have been rated between good and very good.

- Date of latest revision of the website has been provided on the homepages of library websites of Agriculture (72.34%), Medical (62.50%) and Natural and Applied Sciences (78.95%). However, percentage of websites that have provided revision date is relatively less in Social Sciences (50%).

- List of latest additions has been provided by majority of the websites of Natural and Applied Sciences (75.44%) and Social Sciences (75%), while percentage of websites providing the same information is slightly less in Agriculture (55.32%) and Medical (54.17%).

- Contact details of the staff members have been provided by majority of the websites of Agriculture (95.74%), Medical (100%) and Natural and
Applied Sciences (92.98%). Comparatively, the percentage is slightly less in Social Sciences (75%).

**Design and Development:**

- Size of the homepages of library websites of Medical (87.5%), Natural and Applied Sciences (71.93%) and Social Sciences (75%) are in the range of 1 to 200 and 201 to 400 KB in size, while the percentage of homepages of library websites of the same size i.e. 1 to 200KB and 201 to 400KB are relatively less in Agriculture (57.45%).
- There is no significant difference in the loading speed of the homepages of library websites, as majority of the homepages (around 90 percent) of library websites get loaded within 1 to 10 seconds. However, Social Sciences is an exception in this regard, wherein all of the websites (100%) get loaded within 1 to 10 seconds.
- Internal search facility of Agriculture (74.46%), Medical (58.34%) and Natural and Applied Sciences (77.19%) websites have been rated between good and very good. However, all of the websites of Social Sciences (100%) have been rated in the same range.
- Facility provided to search WWW is rated between good and very good for majority of the websites of Agriculture (82.98%), Medical (79.16%) and Natural and Applied Sciences (85.96%), while all of the websites of Social Sciences (100%) have been rated in the same scale.
- Ease of navigation of two-thirds of the websites of Agriculture (70.21%), Medical (66.67%) and Natural and Applied Sciences (71.93%) have been rated between very good and excellent. While, percentage of websites rated in same range is slightly less in Social Sciences (50%).
- Content organization of two-thirds of the library websites of Agriculture (65.96%) and Natural and Applied Sciences (66.67%) have been rated in the range of very good and excellent. While, percentage of websites that
are rated in the same range is high in Medical (79.17%) and slightly less in Social Sciences (50%).

- Printer friendliness of websites has been rated between very good and excellent for majority of the websites of Agriculture (80.85%), Medical (79.16%), Natural and Applied Sciences (74.19%) and Social Sciences (75%).

- Use of ALT-Text has been rated to the level of good and very good for all of the disciplines. Though overall rating is slightly high for Natural and Applied Sciences it is not significant.

- Access to websites in multiple languages is provided by around half of the libraries. However, Natural and Applied Sciences is an exception in this regard, wherein, only 35 percent of the websites have provided the same.

- Text and background colour contrast has been properly used by around 70 percent of the websites of Medical (70.83%) and Natural and Applied Sciences (70.18%). However, percentage of websites with proper use of colour contrast is slightly high in Agriculture (74.47%) and less in Social Sciences (50%).

- Link back to home has been provided by all of the websites of Social Sciences (100%) and around 95 percent of Medical (95.83%) and relatively less percentage in Agriculture (80.85%) and Natural and Applied Sciences (84.21%).

- There are no pages under construction on the websites of Social Sciences (100%), Medical (95.83%), Agriculture (80.85%) and Natural and Applied Sciences (78.95%).

- Websites that are ranked in the first five results of the Google search are around 75 percent in Agriculture (76.60%), Natural and Applied Sciences (71.93%) and Social Sciences (75%), while it is two-thirds in Medical (66.67%).
Search Engine Optimization:

- A proper page title has been used in around 80 percent of the websites of Agriculture (78.72%), Medical (83.33%) and Natural and Applied Sciences (84.46%), while it is 100 percent in Social Sciences.

- Use of H1 element is found in the websites of Agriculture (72.34%), Natural and Applied Sciences (77.19%) and Social Sciences (75%), while percentage is slightly less in Medical (62.50%).

- H2-H6 elements have been used by around half (50%) of the websites of Natural and Applied Sciences (49.12%) and Social Sciences (50%), while it is relatively high in Agriculture (78.22%) and less in Medical (33.33%).

- Metadata is used in majority of the websites of Agriculture (72.34%), Medical (91.67%) and Natural and Applied Sciences (66.67%), while the percentage of websites using metadata is slightly less in Social Sciences (50%).

- Google analytics has been used by around three-fourths of the websites of Agriculture (76.60%) and Social Sciences (75%), while percentage of websites using analytics is slightly more in Medical (87.50%) and less in Natural and Applied Sciences (70.18%).

- Around three-fifths of the websites have used flash for animation in Agriculture (61.70%) and Medical (62.50%). While, percentage of websites using flash is slightly less from Natural and Applied Sciences (49.12%) and Social Sciences (25%).

- XML sitemap has been used by around two-thirds of the websites of Agriculture (63.83%) and Medical (70.83%), while the percentage of websites using the same is slightly high in Social Sciences (75%) and less in Natural and Applied Sciences (61.40%).

- RSS feed has been used in around three-fourths of the websites of Agriculture (76.60%) and Social Sciences (75%), while percentage of websites using RSS feed is relatively more in Medical (91.67%) and Natural and Applied Sciences (82.46%).
Validation:

- Number of HTML validation errors identified on the library websites is in the range of 1 to 25 and 26 to 50 in majority of the websites of Agriculture (76.59%), Medical (58.34%) and Natural and Applied Sciences (63.16%) and all the websites of Social Sciences (100%).
- Number of CSS validation errors identified on the library websites is in the range of 1 to 25 in the websites of Agriculture (65.96%), Medical and Social Sciences (75 percent each) and Natural and Applied Sciences (52.63%).

Accessibility Errors:

- Around three-fifths of the websites of Agriculture (63.83%) and Natural and Applied Sciences (63.16%) have been identified with known errors in the range of 1 to 25 and 26 to 50. While, the percentage of websites in same range of errors is high in Medical (75%) and less in Social Sciences (50%).
- Around half of the websites of Agriculture (53.19%), Natural and Applied Sciences (56.14%) and Social Sciences (50%) have been identified without any likely errors, while the percentage of websites without any likely errors is relatively less in Medical (41.67%).
- Number of potential errors identified is in the range of 51 to 75 and 76 and above in Agriculture (78.72%), Medical (87.5%), Natural and Applied Sciences (70.18%) and Social Sciences (75%).

5.2. Major observations of the study (User Survey)

Homepage Features:

- Information about library and collection details have been rated between good and very good by majority of the users of all the disciplines. This is also proved by the corresponding mean values and the results of the Z test for all the disciplines.
- Staff details, services offered and access to e-resources (open access and subscribed) have been rated between good and very good by majority of
the users of all the disciplines. However, Social Sciences is an exception in this regard, where in the rating is between average to good.

- Visual appealing of the websites is rated to the level of good and very good by the users of Agriculture, Medical and Natural and Applied Sciences, while the same feature has been rated as good by the users of Social Sciences.

**Quality and Presentation of the Content:**

- There is no significant difference in the users’ ratings for Alignment of the text, contrast, clarity and readability of the content, as the rating is between good and very good in all the disciplines.
- Accuracy and up to datedness and use of text alternatives have been rated between good and very good by the users of all the disciplines.
- Users from all the disciplines have rated use of graphics and multimedia between average and good and content organization between good and very good.

**Navigation:**

- There is no statistically significant difference in the users’ ratings for navigational consistency and grouping, as it indicates nearly good with the rating at 3 for all the disciplines.
- Users from all the disciplines have rated ease of navigation between good and very good, while loading speed is rated between very good and excellent. There is no significant difference in users’ ratings for individual features.
- Printer friendliness is rated between good and very good by users of all the disciplines.

**Page Titles and Headings:**

- Page titles and highlighting has been rated between average and good in the score of 2 and 3 by users of all the disciplines. This proves that, there is no significant difference in ratings for both the features.
There is no statistically significant difference in the users’ ratings for headings, as it is between average and good in the score of between 2 and 3 from all the disciplines.

Links Provided:
- Link labels and accuracy of the links show consistent ratings by the users of all the disciplines.
- Users of all the disciplines have rated links to outside resources between average and good. However, users from Social Sciences have rated the same feature relatively high.

Search Facility:
- Use of internal search, global search and provision for searching other catalogues is consistent on library websites of R&D institutions of Medical, Natural and Applied Sciences and Social Sciences in India.
- Library websites of R&D institutions of different disciplines in India show lower ratings for providing access to catalogues of other institutions on similar area.

User Assistance:
- User assistance provided on the library websites of R&D institutions of Medical and Natural and Applied Sciences in India is identical.
- User assistance provided on the library websites of R&D institutions of Agriculture and Social Sciences in India is similar.

Value Additions:
- Details of the new arrivals provided and access to OPAC on the library websites of R&D institutions of Natural and Applied Sciences and Social Sciences in India are identical.
Details of the new arrivals provided and access to OPAC on the library websites of R&D institutions of Agriculture and Medical in India are identical.

Website of the library is a gateway to provide access to information in the R&D institutions. Since, users of the libraries in research environment depend upon the websites, for information. Websites of such institutions especially, should be well structured with quality content. On the other hand, there are other factors which are not having a direct impact on structure of the website, but they decide the overall usability of the websites for example Search facility, user assistance and latest additions to name few. In the background of this, analysis of the observations of the present study shows that Scope and quality, homepage, navigation, page title and headings have been rated to the level of good and very good. While, search facility, user assistance and value additions included on the library websites have been rated in the range of average to good, which is relatively less. Though, all the libraries covered under the study belong to R&D sector, still there is inconsistency in the ratings for the features present on the websites.

Keeping this in view here an attempt has been made to suggest a strategic model for R&D library websites.

5.3. Planning process for design of R &D library website

Before beginning any design or development of a website, it is essential to determine the scope of the work, outline and articulate a clear vision. In addition, it is also required to document a series of best practices followed by other professional web designers, to run the design process smoothly and efficiently. However, designing successful website depends upon knowing about users’ behavior as well as their preference. The project management techniques and strategies suggested by Ballard & Rector (2011) are worth considering in the process of planning and implementation.
• **Clearly articulate vision and goals**
  
  Clear articulation of vision and goals of the website is indispensable, as a designer needs to know what is to be achieved and what a successful outcome is. Create a fresher, more modern and welcoming site, with a clear personality brand for the library and streamline homepage access to search functionality and core user tasks.

• **Core implementation team**
  
  There should be a core implementation team for development of website and library staff members have to be part of the team. This is helpful to ensure that the content and design of the website is in line with the users’ needs.

• **Commit to user-centered thinking**
  
  In addition to defining a team and setting out goals and priorities, it is essential that, the entire organization has to be committed to a user-centered process, early on to make the website designing successful.

• **Conduct quick testing with prototypes**
  
  During the discovery phase of the project, testing of early prototypes of proposed navigation schemes and search models is needed. Users have to be part of the testing process.

• **Commit to understanding your content**
  
  Quite often the content of the site is lost to discussions around link color and background images. Content inventory can help to prioritize content for the design and set the scope of the web design process.

5.4. Strategic Model for R&D Library Website

Based on the observations of the present study, here an attempt has been made to suggest a strategic model for R&D Library website. Model addresses both the content and design aspects of the library website.
### Table-5.4.1: Content Elements

<table>
<thead>
<tr>
<th>Information</th>
<th>Resources</th>
<th>Services</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info about library</td>
<td>E-journals, e-books</td>
<td>Online transaction</td>
<td>Institutions homepage</td>
</tr>
<tr>
<td>Details of the services</td>
<td>Databases</td>
<td>Online reference</td>
<td>Other libraries</td>
</tr>
<tr>
<td>Staff details</td>
<td>Encyclopedias</td>
<td>Online feedback</td>
<td>Other similar institutions</td>
</tr>
<tr>
<td>Working Hours</td>
<td>Research Reports &amp; guides</td>
<td>Current contents &amp; new additions</td>
<td>OPAC</td>
</tr>
<tr>
<td>Library brochure</td>
<td>Thesis &amp; Dissertation</td>
<td>Virtual user orientation</td>
<td>OPACs of other libraries</td>
</tr>
<tr>
<td>FAQ &amp; Procedures</td>
<td>Patents &amp; Standards</td>
<td>Library News</td>
<td>Help Section</td>
</tr>
</tbody>
</table>

### Table-5.4.2: Web Design Features

<table>
<thead>
<tr>
<th>Text &amp; Graphic</th>
<th>Consistency, Navigation &amp; Loading</th>
<th>Accessibility &amp; maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple &amp; error free language</td>
<td>Global header &amp; Logo</td>
<td>Use flash and blinking sparingly</td>
</tr>
<tr>
<td>Suitable fonts &amp; graphs</td>
<td>Home link on every page</td>
<td>Use frames sparingly</td>
</tr>
<tr>
<td>Clear page titles &amp; headings</td>
<td>Link to org homepage</td>
<td>Use ALT-Text</td>
</tr>
<tr>
<td>Page alignment</td>
<td>Consistent navigational elements</td>
<td>Avoid link titles like click here</td>
</tr>
<tr>
<td>Use proper contrast</td>
<td>Internal search &amp; Global</td>
<td>Test links before mounting</td>
</tr>
<tr>
<td>Printer friendliness</td>
<td>No pages under construction</td>
<td>Test readability before mounting</td>
</tr>
<tr>
<td>Standard coding &amp; proper graphics</td>
<td>Use large graphics sparingly</td>
<td>Regular evaluation &amp; revision</td>
</tr>
</tbody>
</table>
5.5. Areas of further research

The areas of research to be carried out by the researchers in strengthening the study as an extension are;

- A comparative study can be conducted on library websites of government funded R&D institutions and private funded institutions.
- A comparative study can be conducted on library websites of Indian R&D institutions and institutions of other countries.

Conclusion:

Libraries have immense scope for the improvement in the manner of communication of mission through their websites. Recognizing the website as a powerful communication channel, libraries from all the disciplines should focus on the effective designing of the websites. Findings of the present study shows that the library websites of Natural and Applied Sciences have been rated to the higher level for most of the features, followed by the websites of Medical. However, the websites of Agriculture have also been rated to the same level as Medical websites. This was found in the cases of quality of the presentation, navigation and other design features. Number of links used and value additions included are the areas, wherein websites of the Social Sciences have been rated to the higher level. Number of validation and accessibility errors found on the websites is relatively high in Agriculture and Medical. While, websites of Natural and Applied Sciences and Social Sciences have also been found with errors, however the ratio is relatively less.

Observations pertaining to Agriculture and Social Sciences websites show a strong need for making the websites more visually appealing and usable, as the ratings provided are not to the higher level. Despite of the higher ratings, websites of Natural and Applied Sciences and Medical libraries should also make efforts to make their websites even more user friendly.
One of the reasons for the higher inconsistency in the ratings provided to the websites of different disciplines is, non-availability of proper guidelines for library websites in India, especially in the case of R&D is yet to be developed. This imposes development of proper web design guidelines for libraries and criteria to evaluate the websites. This is again reliant on the interest of the library staff members of those libraries and support from the parent organization extended to libraries.

References: