BT 623: Research Methodology

Lecture 18: How to Structure a Thesis

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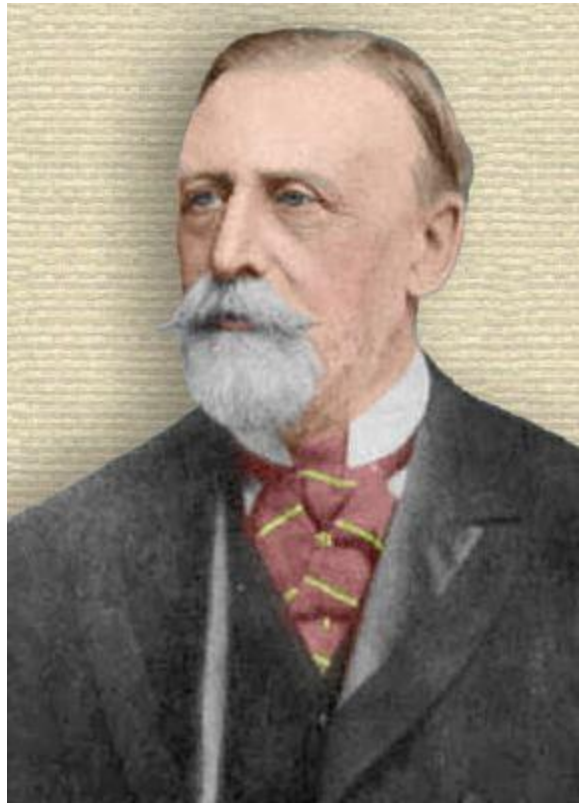
“The use of thesis-writing is to train the mind, or to prove that the mind has been trained; the former purpose is, I trust, promoted, the evidences of the latter are scanty and occasional.”

- Sir Thomas Clifford Allbutt(20 Jul 1836 - 22 Feb 1925)

From Preface to First Edition to *Notes on the Composition of Scientific Papers* (1904), English physician who invented the short clinical thermometer (1866).



The quote means thesis-writing is meant to train the mind, but proof of that training is often limited or inconsistent, even though the process should ideally show intellectual growth.

Introduction

- **What is a Thesis?**

A thesis is an extended argument that must exhibit logical, structured, and defensible reasoning, grounded in credible and verifiable evidence. To pass, a thesis should make an original contribution to knowledge, as evaluated by experts in the field.

While there are various types of scholarly works, theses are unique in that no standard or generic structure applies to them—each is different. Despite the immense effort required to produce a thesis, its readership is typically limited to project supervisors, examiners, and a select group of specialized academics.

Importance of Thesis Structure

- **Guides the Writing Process:** A clear structure divides the thesis into manageable sections, making it easier to approach each part step by step.

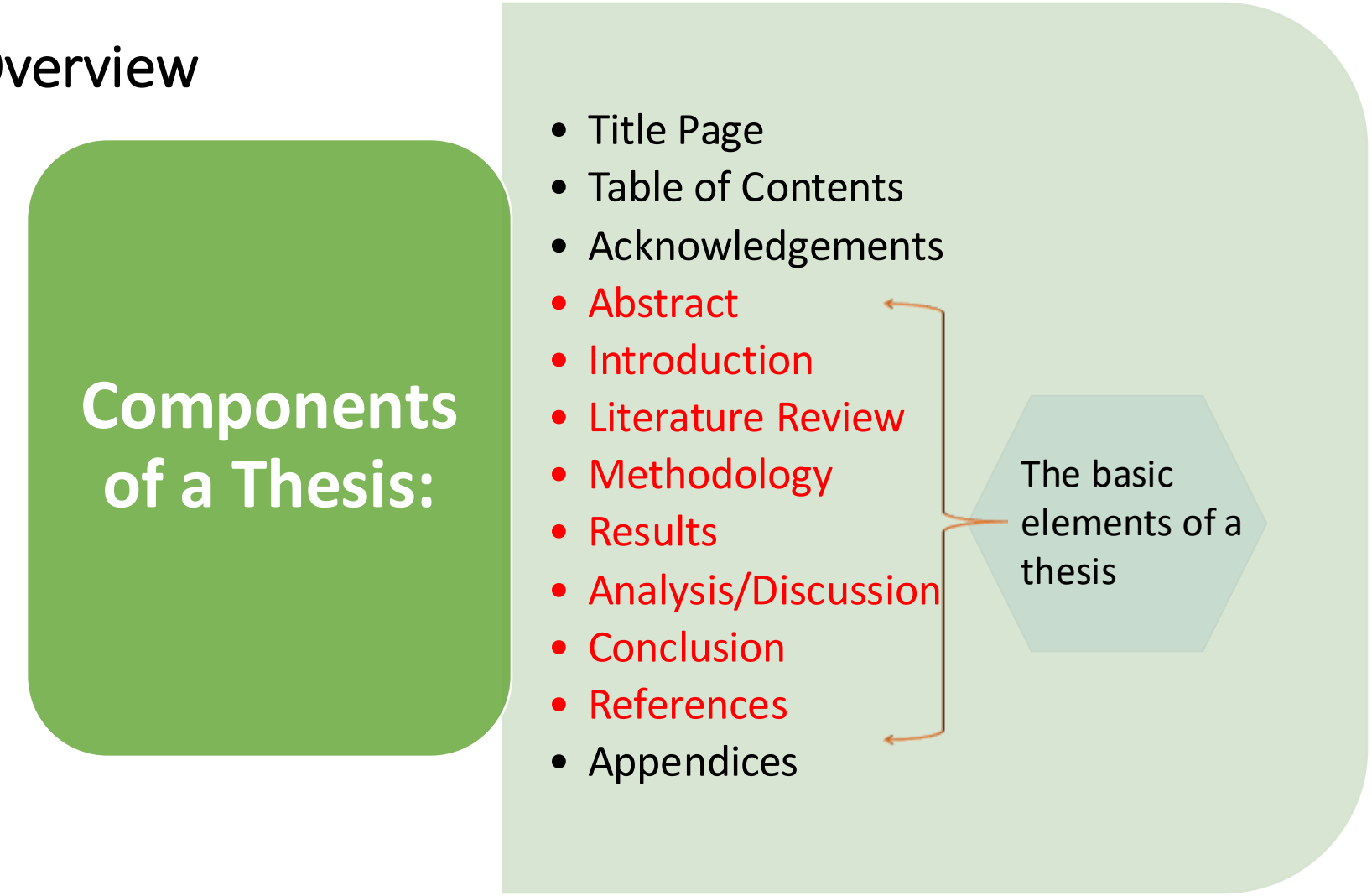
- **Enhances Clarity:** A well-organized thesis enables readers to follow the argument and better understand the research findings.

- **Ensures Standardization:** Adhering to a common structure ensures the thesis meets academic standards, which is crucial for evaluation by committees.

- **Components of Structure:** Key sections typically include the introduction, literature review, methodology, results, discussion, and other sections (such as acknowledgments, bibliography, and appendix).

- **Institutional Guidelines:** It’s important to follow specific university guidelines, as they may have unique requirements for the structure of the thesis.

Thesis Structure Overview



The general purpose and the content requirement of each of these components and discussed further.

Title Page

- **Key Elements**:
  - Title of the Thesis
  - Your Name
  - Advisor’s Name
  - Institution’s Name
  - Date of Submission
- **Format**:
  - Use bold, underline headings, and maintain spacing according to guidelines and wherever necessary.

Thesis Title

A
Thesis Submitted
in Partial Fulfillment of the Requirements
for the Degree of
DEGREE NAME
By

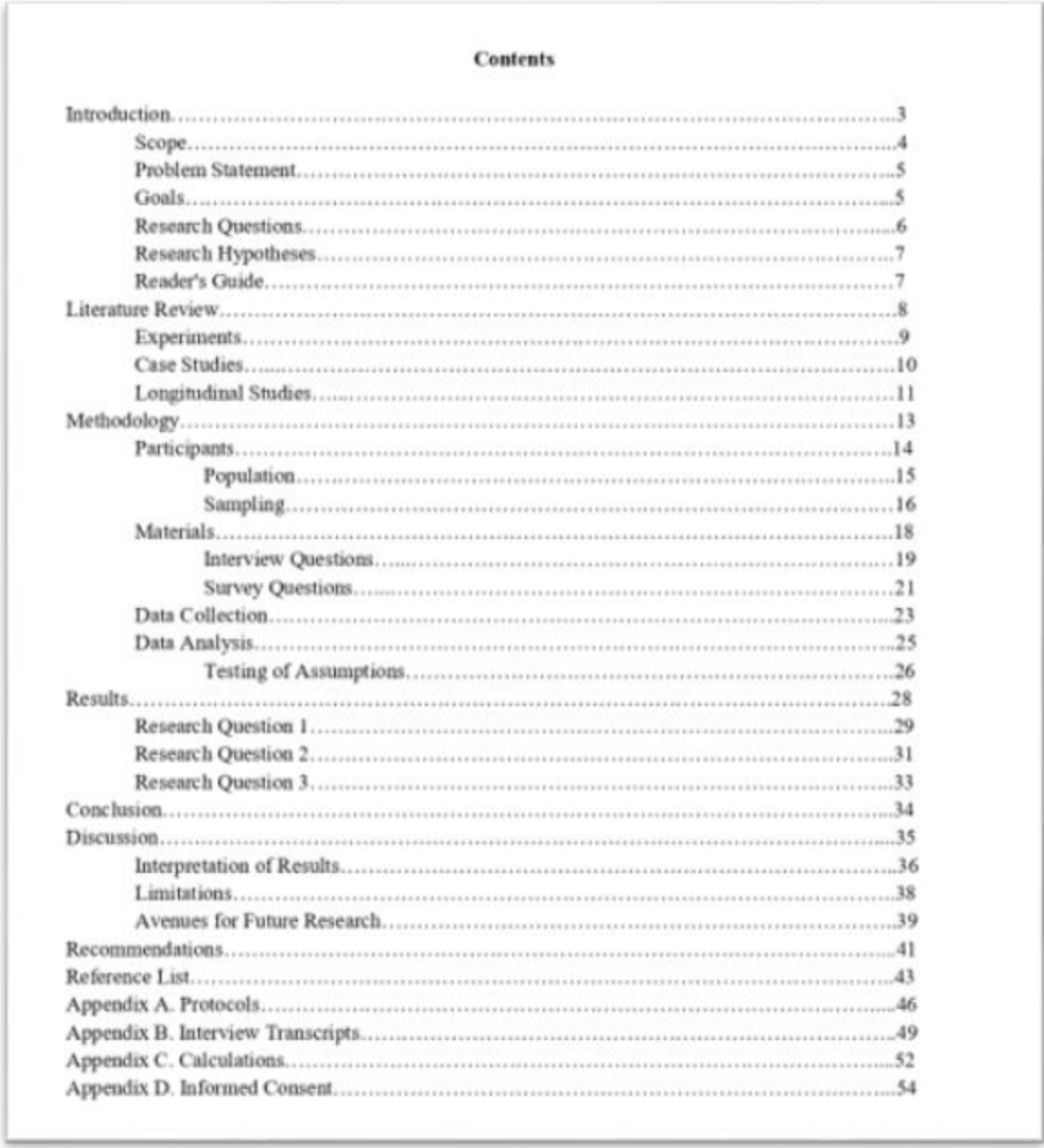
AUTHOR NAME
Under the Supervision of Dr. SUPERVISOR NAME

Department Name
Indian Institute of Technology Guwahati
April, 2015

Fig.- IIT Guwahati Thesis Title page Template

Table of Contents

- **Purpose**:
  - The table of contents serves as a navigational guide for the reader, helping them locate specific sections within the thesis quickly and easily.
- **Content**:
  - It includes a list of all sections arranged in the proper order, accompanied by page numbers, ensuring the reader knows where each section begins and ends.
  - The table of contents uses serial numbers to organize the sections, providing a clear, structured overview of the thesis for easy reference.



Contents

Fig.- Table of Contents Template

Acknowledgements

- **Purpose**:
  - The Acknowledgements section expresses gratitude to those who supported you during your thesis journey, highlighting the collaborative nature of academic work
- **Content**:
  - It typically includes names of individuals, mentors, or organizations that provided assistance, guidance, or encouragement throughout your research process.

Acknowledgements

I would like to thank all the people who contributed in some way to the work described in this thesis. First and foremost, I thank my academic advisor, Professor Julia A. Kornfield, for accepting me into her group. During my tenure, she contributed to a rewarding graduate school experience by giving me intellectual freedom in my work, supporting my attendance at various conferences, engaging me in new ideas, and demanding a high quality of work in all my endeavors. Additionally, I would like to thank my committee members Professor David A. Tirrell, Professor John F. Brady, and Professor Zhen-Gang Wang for their interest in my work.

Every result described in this thesis was accomplished with the help and support of fellow labmates and collaborators. Neal Scruggs and I worked together on several different phases of the self-assembled gels project, and without his efforts my job would have undoubtedly been more difficult. I greatly benefited from his keen scientific insight, his knack for solving seemingly intractable practical difficulties, and his ability to put complex ideas into simple terms. Yan Xia joined the group when I was beginning my last year as a graduate student, and, with his knowledge of chemistry and relentless work ethic, he was able to successfully carry out the synthesis of the model covalent LC networks. I gained a lot from his vast chemistry knowledge and scientific curiosity. I was fortunate to have the chance to work with Dr. Michael Kempe, who patiently taught me his method for synthesizing LC triblocks, in addition to a number of other laboratory techniques, and who worked closely with me in the synthesis of the LC triblocks I present in this thesis. He was an extremely reliable source of practical scientific knowledge, and I am grateful for his achievements during his time at Caltech, from which the work described in this thesis followed. I worked (nonstop) in the laboratory of Professor Samuel Sprunt of Kent State University for one long week in July 2005, and two very

Fig.- A sample first page of Acknowledgements

Abstract

- **Purpose**: An abstract serves as a concise summary of the entire thesis, providing readers with a quick understanding of the research's main points and findings.

- **Length and Clarity**: A well-crafted abstract is typically not more than 250 words, ensuring it is precise and clear, highlighting the importance of the research.

- **Content Requirements**: It should explicitly mention the crux of the thesis, summarizing the core arguments, hypotheses, and results without repeating the title.

- **Significance**: The abstract is crucial as it allows readers to quickly assess the relevance and contribution of the thesis to the existing body of knowledge.

Introduction

- **Purpose**: The introduction sets the stage for the thesis by outlining its core arguments, hypotheses, and results, establishing the relevance of the research .

- **Content Requirements**:
  - **General Topic**: State the general topic and provide background information .
  - **Literature Review**: Include a review of related literature to contextualize the research .
  - **Definitions**: Define key terms and the scope of the thesis topic .
  - **Current Situation**: Evaluate the existing situation and identify gaps in the literature .
  - **Research Importance**: Highlight the importance of the proposed research .
  - **Research Questions**: State the main research questions and objectives .
  - **Hypotheses**: Present the study hypotheses .
  - **Methodology Outline**: Briefly outline the order of information and methodology used in the thesis.

Literature Review

- **Purpose**: The literature review surveys academic sources on a specific subject, providing an overview of current knowledge and identifying relevant theories, methods, and gaps in existing research.

- **Content Requirements**:
  - **Source Identification**: Find and include relevant publications related to the thesis topic.
  - **Critical Analysis**: Critically analyze the sources rather than just summarizing them.
  - **Synthesis**: Synthesize findings to present a clear picture of the state of knowledge.
  - **Logical Structure**: Organize the review logically and chronologically to outline knowledge gaps.
  - **Research Contribution**: Explain how the thesis will address these gaps.

Some simple and straightforward tips that serve as a comprehensive guide for authors on how to craft an effective literature review:

Step 1: Examine similar works to understand how to structure a well-organized literature review.

Step 2: Focus on analysis rather than mere synthesis—authors should provide a thorough critique of the subject.

Step 3: Organize the literature review in a systematic manner.

Step 4: Clearly define the scope of the literature review by specifying its boundaries.

Step 5: Avoid plagiarism by ensuring originality in content.

Step 6: Pay attention to using clear and precise language.

Methodology

- **Purpose**: The methodology section serves to detail the research methods and procedures employed in the study. It enhances the credibility of the research by allowing readers to understand the justification for the chosen methods and how they contribute to the overall research objectives.
- **Content Requirements**:
  - **Research Design**: Outline the overall research design, including whether it is qualitative, quantitative, or mixed methods.
  - **Philosophical Framework**: Discuss the philosophical approach guiding the research, such as positivism or interpretivism.
  - **Research Approach**: Specify the approach taken, whether it is exploratory, descriptive, or explanatory.
  - **Methods Description**: Clearly describe the specific methods used for data collection and analysis, ensuring they align with the research questions.
  - **Sampling Strategy**: Explain the sampling strategy, including how participants or data sources were selected.
  - **Data Collection Techniques**: Detail the techniques used for data collection, such as surveys, interviews, or experiments.
  - **Data Analysis Procedures**: Describe the procedures for analyzing the collected data, including any statistical or thematic analysis methods used.
  - **Limitations**: Acknowledge any potential limitations or challenges faced during the research process.

Results

- **Purpose**: The results section presents the findings of the research, allowing readers to understand the outcomes of the study without bias or interpretation. It focuses solely on factual data .

- **Content Requirements**:
  - **Factual Data**: Include only factual data derived from the research, avoiding personal interpretations or opinions .
  - **Formatting**: Use tables, graphs, and subheadings to organize the data clearly, making it easy for readers to discern the results .
  - **Clarity**: Ensure that the results are presented in a clear and concise manner, enabling readers to grasp the significance of the findings easily .
  - **Generic Comments**: Incorporate generic comments to provide context but avoid reiterating previously mentioned information, such as that in the title of the document

This structured approach ensures that the results section effectively communicates the research findings to the audience.

Analysis/Discussion

- **Purpose**: The discussion section interprets the research findings, explaining their significance and how they relate to existing literature. It allows the researcher to present their insights and arguments regarding the results obtained.

- **Content Requirements**:

    - **Summary of Findings**: Begin with a brief summary of the research outcomes, linking them back to the hypotheses.
    - **Interpretation**: Discuss how the results address the research questions and hypotheses, providing insights into their implications.
    - **Comparison with Literature**: Compare findings with existing studies, highlighting agreements and disagreements to situate the research within the broader academic context.
    - **Limitations**: Acknowledge any limitations of the study that may affect the interpretation of results.
    - **Future Research**: Suggest areas for future research based on the findings and limitations identified.

Some key questions to help you write a strong Discussion section:

- How well do you understand the objective of your study?
- What message do your results convey?
- How do your findings compare with those in the existing literature?
- Why are your findings important?
- How should your findings be interpreted?

Conclusion

- **Purpose**: The conclusion section provides a definitive answer to the research hypothesis and summarizes the overall findings of the study, emphasizing the significance of the research conducted.

- **Content Requirements**:

    - **Answer to Hypothesis**: Clearly state the conclusion drawn from the research, addressing the initial hypothesis directly.
    - **Achievement of Aims**: Highlight how the research objectives were met, reinforcing the contributions made to the field.
    - **Limitations**: Discuss any limitations encountered during the research, indicating areas where further investigation is needed

References

- **Purpose**: References are crucial for acknowledging the sources of information and ideas used in a thesis. They lend credibility to the research and allow readers to locate the original materials for further study.

- **Content**: References typically include:
  - Books, journal articles, and conference papers that were cited.
  - Online resources and databases relevant to the research.
  - Any other materials that contributed to the development of the thesis.

References ensure academic integrity and provide a foundation for the research presented in the thesis.

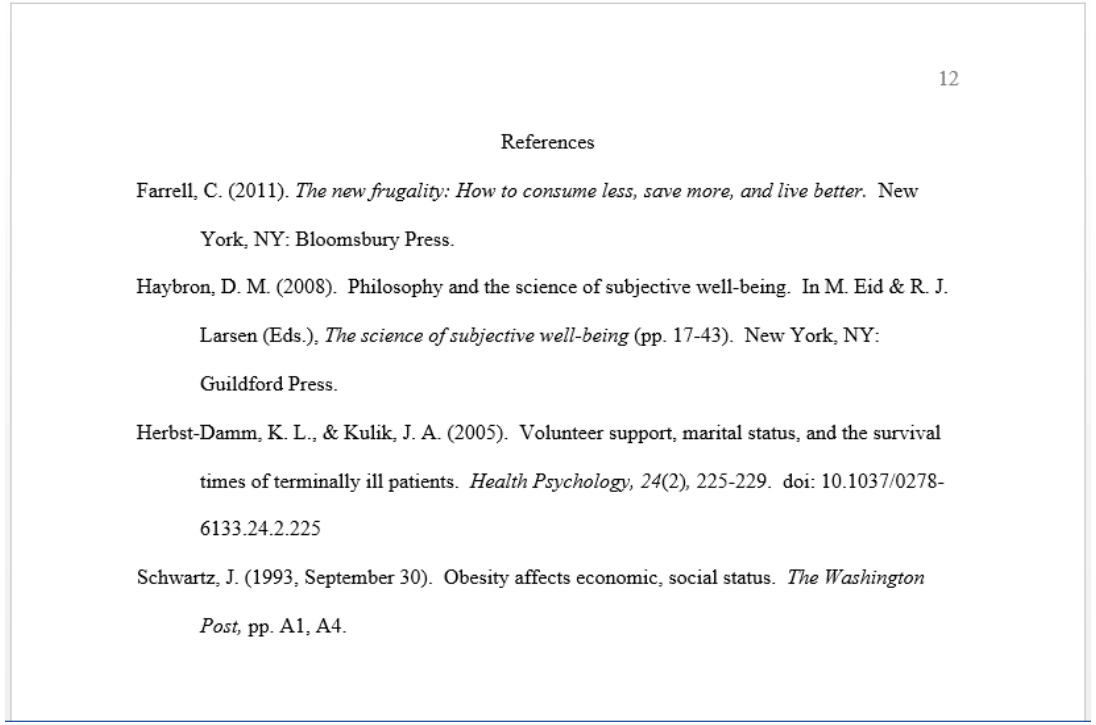


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Fig.- An example of Reference section

Different Styles of Referencing

- **AMS (American Meteorological Society)**: Preferred in the Department of Meteorology; requires journal name abbreviations.
- **APA (American Psychological Association)**: A variant of Harvard style, commonly used in social sciences.
- **Chicago**: Offers two options: Notes and bibliography (numbered style) or Author-date references (brief citations).
- **Harvard**: Widely used, with detailed guidance available for various sources.
- **MHRA (Modern Humanities Research Association)**: Uses numbers linked to footnotes or endnotes, or name-year citations.
- **OSCOLA and Vancouver**: Other styles mentioned, with specific applications in legal and medical fields, respectively.

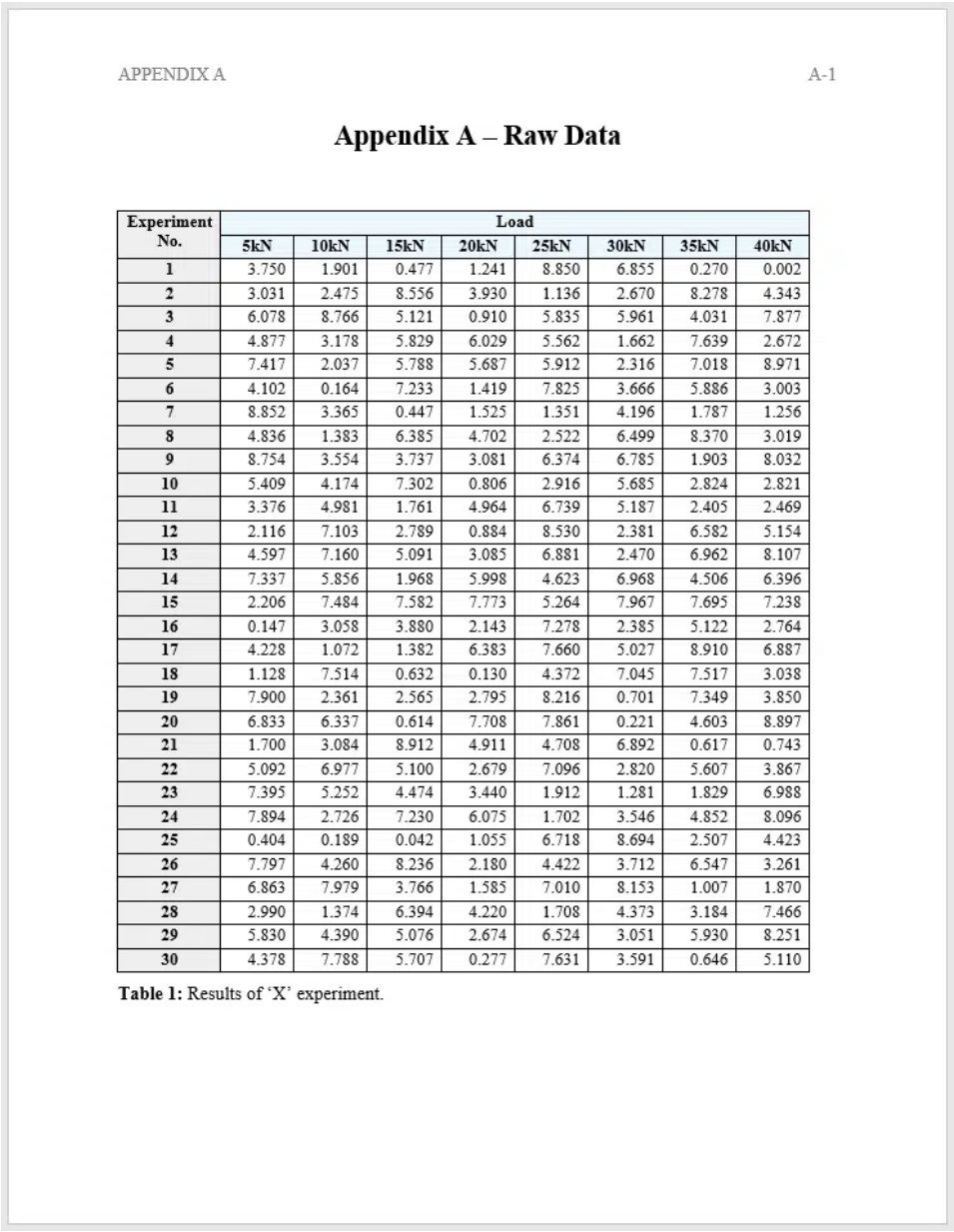
Appendices

- **Purpose**: Appendices serve to provide supplementary information that is too lengthy or detailed to include in the main body of the thesis. They help maintain the flow of the main text while still offering essential data for reference.

- **Content**:

  Typically, appendices may include:

  - Raw data or detailed calculations.
  - Additional charts, graphs, or tables that support the research findings.
  - Questionnaires or surveys used in the research.
  - Any other relevant material that enhances the reader's understanding of the thesis



APPENDIX A A-1

Appendix A – Raw Data

Experiment No.	Load							
	5kN	10kN	15kN	20kN	25kN	30kN	35kN	40kN
1	3.750	1.901	0.477	1.241	8.850	6.855	0.270	0.002
2	3.031	2.475	8.556	3.930	1.136	2.670	8.278	4.343
3	6.078	8.766	5.121	0.910	5.835	5.961	4.031	7.877
4	4.877	3.178	5.829	6.029	5.562	1.662	7.639	2.672
5	7.417	2.037	5.788	5.687	5.912	2.316	7.018	8.971
6	4.102	0.164	7.233	1.419	7.825	3.666	5.886	3.003
7	8.852	3.365	0.447	1.525	1.351	4.196	1.787	1.256
8	4.836	1.383	6.385	4.702	2.522	6.499	8.370	3.019
9	8.754	3.554	3.737	3.081	6.374	6.785	1.903	8.032
10	5.409	4.174	7.302	0.806	2.916	5.685	2.824	2.821
11	3.376	4.981	1.761	4.964	6.739	5.187	2.405	2.469
12	2.116	7.103	2.789	0.884	8.530	2.381	6.582	5.154
13	4.597	7.160	5.091	3.085	6.881	2.470	6.962	8.107
14	7.337	5.856	1.968	5.998	4.623	6.968	4.506	6.396
15	2.206	7.484	7.582	7.773	5.264	7.967	7.695	7.238
16	0.147	3.058	3.880	2.143	7.278	2.385	5.122	2.764
17	4.228	1.072	1.382	6.383	7.660	5.027	8.910	6.887
18	1.128	7.514	0.632	0.130	4.372	7.045	7.517	3.038
19	7.900	2.361	2.565	2.795	8.216	0.701	7.349	3.850
20	6.833	6.337	0.614	7.708	7.861	0.221	4.603	8.897
21	1.700	3.084	8.912	4.911	4.708	6.892	0.617	0.743
22	5.092	6.977	5.100	2.679	7.096	2.820	5.607	3.867
23	7.395	5.252	4.474	3.440	1.912	1.281	1.829	6.988
24	7.894	2.726	7.230	6.075	1.702	3.546	4.852	8.096
25	0.404	0.189	0.042	1.055	6.718	8.694	2.507	4.423
26	7.797	4.260	8.236	2.180	4.422	3.712	6.547	3.261
27	6.863	7.979	3.766	1.585	7.010	8.153	1.007	1.870
28	2.990	1.374	6.394	4.220	1.708	4.373	3.184	7.466
29	5.830	4.390	5.076	2.674	6.524	3.051	5.930	8.251
30	4.378	7.788	5.707	0.277	7.631	3.591	0.646	5.110

Table 1: Results of 'X' experiment.

Fig.- An example of what a thesis or dissertation appendix could look like.

Conclusion & Best Practices

- **Importance of Following the Structure**: Adhering to a structured format is essential for presenting research clearly and logically. A well-organized thesis helps readers understand the flow of ideas and arguments, making it easier to follow the research narrative.
- **Adhere to Institutional Guidelines**: Each institution may have specific guidelines for thesis structure. It is crucial to consult these guidelines to ensure compliance, as they may differ from general recommendations. Following these rules can prevent issues during the submission process.
- **Tips for Maintaining Clarity and Organization**:
  - Break down the writing process into manageable sections, focusing on one part at a time.
  - Use clear headings and subheadings to guide the reader through the thesis.
  - Regularly review and revise each section to enhance clarity and coherence.

Further readings (thesis repositories)

Shodhganga@INFLIBNET is a platform where Ph.D. students can upload their theses, making them freely available to everyone. It helps to collect, organize, store, share, and protect these digital documents submitted by researchers.
https://shodhganga.inflibnet.ac.in/

Lakshminath Bezbaroa Central Library Digital Repository (IITG) is an Institutional digital archive stores, preserves, and shares the academic work of faculty and researchers, allowing them to securely deposit and access scholarly content.
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