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CHATGPT 3.5

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Main Title goes here

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Dedicated to future PhD students.

ABSTRACT

In a Ph.D. thesis, an abstract is a concise summary of the research, its objectives, methods, key findings, and conclusions. The abstract is typically found at the beginning of the thesis, and it serves as a brief overview of the entire document. Components of an abstract are:

1. **Research Topic and Purpose:** The abstract should start by stating the research topic or problem that the thesis addresses. It should also mention the research's primary objectives or goals.
2. **Methodology:** A brief description of the research methods and approaches used in the study. This may include information on data collection, experiments, surveys, or any other research techniques employed.
3. **Key Findings or Results:** Summarize the most important and relevant findings or results of the research. These should be presented in a concise and clear manner.
4. **Significance and Contribution:** Explain why the research is important and what it contributes to the field. Mention any novel insights, advancements, or applications that result from the study.
5. **Conclusion:** Provide a summary of the conclusions drawn from the research. What can be inferred from the findings, and what are the implications for the field or for future research?

While the abstract appears at the beginning of the thesis, it is typically written after the completion of the entire document, as it should accurately reflect the contents of the thesis.

KEYWORDS Keyword-1; Keyword-2; Keyword-3;

ACKNOWLEDGEMENTS

Acknowledgments

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APPENDED ARTICLES

- I *Title*
 Author 1, Author 2 & Author 3
 Conference/Journal Data

- II *Title*
 Author 3, Author 2 & Author 3
 Conference/Journal Data

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DEFINITIONS

Unknown Word 1: Definition 1

Unknown Word 2: Definition 2

ACRONYMS

PLC Programmable Logic Controller

XXX x x x

INTRODUCTION

This chapter provides the reader with an understanding of the research context, the significance of the study, the research problem/question, & an outline of the structure of the thesis. The following should be included in this chapter:

1. Research Background and Context:
 - Provide an overview of the broader research area and its significance. Explain why this field is important and how your research fits into it.
 - Mention key developments, theories, or studies related to your topic. Highlight any gaps, unresolved questions, or limitations in the existing literature that your research aims to address.
2. Research Problem or Question:
 - Clearly state the specific research problem or question that your thesis addresses. This should be concise and to the point.
 - Explain the relevance and importance of the research problem and its potential impact on the field.
3. Research Objectives and Hypotheses:
 - Outline the objectives of your research. What are you trying to achieve or investigate?
 - If applicable, state any hypotheses that you intend to test or assumptions you are making in your research.
4. Research Scope and Limitations:
 - Define the boundaries of your research. What will be included and excluded from your study?
 - Discuss any practical or methodological limitations that might affect the research.
5. Research Significance and Contributions:
 - Describe the potential contributions of your research to the field. What new knowledge, insights, or applications will your work offer?
 - Explain how your research builds upon or extends existing work.

6. Thesis Structure:

- Provide an overview of the organization and structure of the thesis. Mention how the subsequent chapters are connected and the purpose of each chapter.

7. Methodological Approach (optional):

- If your research involves a unique or complex methodology, you can briefly introduce it in the introduction. However, detailed methodological explanations are often placed in a separate chapter.

8. Justification for the Study:

- Explain why your research is relevant not only from an academic standpoint but also in terms of practical applications or societal impact.

9. Motivation and Personal Connection (optional):

- Some introductions include a personal motivation or connection to the research topic. This can provide a human touch and explain why you, as the researcher, are passionate about the subject.

The introduction chapter should be well-structured, engaging, and clear. It should set the stage for the rest of the thesis, helping readers understand the purpose of the research and why it matters.

Think about who will read this thesis?

Think about why they would want to read your thesis?

1.1 RESEARCH QUESTION

Research questions guide research activities where the method, theory and results articulate findings in these activities. Some characteristics of research questions are: 1. Clarity and Specificity; 2. Feasibility; 3. Relevance; 4. Originality; 5. Testability; 6. Significance and 7. Open-Endedness.

RQ.I: Research Question

RQ.II: Research Question

RQ.II.A: Research Question

RQ.II.B: Research Question

1.1.1 *Headings, Depth-Level, Table and Figure*

1. Depth level upto 3 is preferred. That is, chapter, section and subsection. Anything further makes it difficult to follow. There are no rules for this.
2. Table: 1.1 is an example of a table.
3. Citations and reference example: [1] and [2].
4. Figure: 1.1 is a picture of a two arm robot that might change the world [3].

Table 1.1: Example of a table.

RQ	Appended Articles					
	I	II	III	IV	V	VI
RQ.I	✓		✓	✓	✓	✓
RQ.II.A		✓	✓	✓	✓	
RQ.II.B		✓	✓	✓	✓	

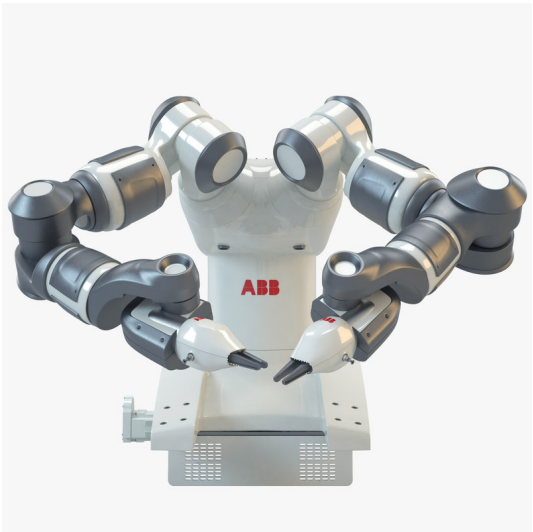


Figure 1.1: Picture of a Collaborative Robot [3].

METHODOLOGY

The methodology chapter describe and explain the research methods, techniques, and procedures you used to conduct your study. It serves as a roadmap for how you gathered and analyzed data, enabling other researchers to understand and potentially replicate your work.

2.1 CONSIDERATIONS

As you develop this chapter, the title could be one of the following: 1. Method, 2. Methodology, 3. Methodological Approach. Consider these points in this chapter:

1. Research Philosophy and Approach:
 - a) Start by explaining your research philosophy or paradigm (e.g., positivism, interpretivism) and approach (e.g. deductive, inductive).
 - b) Justify your choice of philosophy and approach, explaining why they are appropriate for your research.
2. Research Design:
 - a) Describe the overall research design or framework of your study (e.g. experimental, survey, case study, qualitative, quantitative).
 - b) Justify your choice of philosophy and approach, explaining why they are appropriate for your research.
 - c) Explain why you chose this particular design and how it aligns with your research objectives.
3. Data Collection Methods:
 - a) Detail the methods used to collect data. This might include surveys, interviews, observations, experiments, archival research, etc.
 - b) Explain how you selected or recruited participants, if applicable.
 - c) Discuss any tools or instruments you used (e.g. questionnaires, interview guides).
4. Data Analysis Methods:
 - a) Describe how you analyzed the collected data. This could involve statistical techniques, content analysis, thematic analysis, or other relevant methods
 - b) Justify why these methods were chosen and how they align with your research objectives.

5. Sampling Strategy:

Explain your sampling strategy, including the criteria for participant selection, sample size considerations, and the rationale behind your choice of sample.

6. Ethical Considerations:

a) Discuss any ethical concerns related to your research, such as informed consent, data privacy, or potential risks to participants. b) Explain how you addressed these ethical concerns and obtained necessary approvals or permissions.

7. Data Collection Procedures:

Provide a step-by-step description of how data was collected, including any specific protocols or procedures you followed.

8. Data Validation and Reliability:

Explain how you ensured the validity and reliability of your data. Discuss any measures taken to reduce bias or errors.

9. Data Management:

Describe how the collected data was stored, organized, and managed, including any software or tools used for this purpose.

10. Research Timeline (optional):

If relevant, provide a timeline of when data collection and analysis took place, showing the research's progression.

11. Challenges and Limitations:

Address any challenges or limitations encountered during the research process, and discuss how you mitigated or managed them.

12. Comparison to Alternative Methods (optional):

If there were alternative methods that could have been used, briefly discuss why you chose your specific approach over others.

2.2 SUMMARY

The methodology chapter should be written in a clear and detailed manner to enable other researchers to understand and potentially replicate your study. It's also important to ensure that the methodology aligns with your research objectives and research design, providing a strong foundation for the subsequent chapters of your Ph.D. thesis, particularly the data analysis and results chapters.

FRAME OF REFERENCE

In a Ph.D. thesis or any research paper, a frame of reference typically refers to the theoretical or conceptual framework that serves as a foundation for your study. This framework provides a structure for understanding, interpreting, & analyzing the research problem and the data or evidence you present. It helps readers & researchers in your field to contextualize and make sense of your work.

3.1 CONSIDERATIONS

As you develop this chapter, the chapter title can be one of the following: Theory, Theoretical Background, Frame of Reference. Here are the key aspects of a frame of reference in a Ph.D. thesis:

1. **Theoretical Framework:** This involves the theoretical perspectives, concepts, and models that you draw upon to guide your research. It helps you explain and make sense of the phenomena you're investigating.
2. **Conceptual Framework:** This is a more specific subset of the theoretical framework. It consists of key concepts and relationships that are directly relevant to your research. It provides a structure for analyzing and interpreting your data.
3. **Related Literature:** The frame of reference often includes a review of relevant literature, which demonstrates how your study is situated within the existing body of knowledge in your field. This literature review helps establish the context and importance of your research.
4. **Research Questions or Hypotheses:** The frame of reference should connect your theoretical and conceptual framework to your specific research questions or hypotheses. It shows how the established theories and concepts are applied to your study.
5. **Justification for Framework Choice:** You should explain why you selected this particular frame of reference and how it aligns with your research objectives. What makes it suitable for your study, and why is it the best fit among available alternatives?
6. **Methodological Implications:** Describe how your frame of reference influences the choice of research methods and data analysis techniques.

Theoretical and conceptual frameworks can guide the entire research process.

7. Practical Applications: If applicable, discuss how the knowledge derived from your frame of reference can be practically applied in your field or in solving real-world problems.
8. Limitations and Critiques: Acknowledge any limitations or critiques of your chosen frame of reference. No framework is perfect, and it's essential to recognize its weaknesses.

3.2 SUMMARY

In essence, the frame of reference helps set the intellectual context for your research, and it's a crucial part of any academic work. It provides a roadmap for the reader to understand how you approach your research, which theories or models you rely on, and why your study is relevant and significant within your field.

RESULT

This chapter is where you present the findings of your research complemented by a detailed account of the data, evidence, and outcomes of your study.

4.1 CONSIDERATIONS

As you develop this chapter, the chapter title can be one of the following: Result, Framework, Case Analysis Here's what should be included in the results chapter:

1. **Presentation of Data:** Display your data in a clear and organized manner. This can include tables, charts, graphs, figures, or any other appropriate visual representations to help readers understand the results.
2. **Description of Data:** Provide a written description or narrative of the data presented. Explain what the data represents, how it was collected, and any notable characteristics or patterns.
3. **Raw Data:** In some cases, you may choose to include raw data or transcripts in appendices for readers who want to delve deeper into your findings. However, this is not always necessary and should be considered carefully.
4. **Visual Aids:** Ensure that visual aids are labeled, appropriately titled, and properly referenced in the text. Make it clear how they relate to your analysis and conclusions.
5. **Avoid Interpretation:** The results chapter is primarily focused on presenting the data and findings. Avoid interpreting the results in this section; that is the role of the discussion chapter that follows.

4.2 SUMMARY

The results chapter should be a factual and transparent presentation of your findings, allowing readers to draw their own conclusions about the significance of the data. It is in the subsequent discussion chapter that you will provide interpretation, context, and the implications of the results, drawing connections to your research objectives and the existing body of knowledge in your field.

5

DISCUSSION

This chapter is where you interpret and analyze the results. This chapter allows you to delve into the implications of your findings, discuss their significance, and connect your research to the broader field of study.

5.1 CONSIDERATIONS

Some considerations for what should be included in the discussion chapter are:

1. **Interpretation of Results:** Begin by interpreting the results and explaining their meaning. Discuss the patterns, trends, and relationships you observed in the data. Address any unexpected or contradictory findings and offer possible explanations.
2. **Comparison with Previous Research:** Analyze how your findings align with or differ from existing literature and research in your field. Discuss how your research contributes to or challenges the current understanding of the topic.
3. **Hypotheses or Research Questions:** Revisit the hypotheses or research questions you posed in the introduction. Explain whether your results support or reject these statements and what this means for your study.
4. **Theoretical Framework:** Discuss how your results fit within the theoretical or conceptual framework you introduced in the earlier chapters. Explain how the theory guided your research and what it reveals about the underlying principles.
5. **Practical Implications:** Explore the practical implications of your findings. How can they be applied in the real world or in your field of study? What are the potential practical benefits or recommendations?
6. **Limitations:** Acknowledge the limitations of your study. Discuss any constraints, weaknesses, or potential sources of bias that may have affected your results. Honesty about limitations is crucial for maintaining the credibility of your research.
7. **Future Research Directions:** Propose potential directions for future research based on the gaps or questions that your study has uncovered. What further inquiries or studies could build upon your work?

8. **Contributions to the Field:** Summarize the contributions your research makes to your field or discipline. Highlight the novel insights, advancements, or changes in understanding that result from your work.
9. **Summary and Conclusion:** Provide a concise summary of the key points and conclusions drawn from your analysis. Highlight your main contributions.
10. **Reflect on the Research Process:** Reflect on your research process, including the methods used, data collection, and any challenges you encountered. This can help future researchers understand the practical aspects of conducting similar research.

5.2 SUMMARY

The discussion chapter should offer a clear and thoughtful analysis of your research findings, guiding the reader through your thought process and helping them understand the broader implications of your work. It is a critical component of your thesis, as it demonstrates your ability to synthesize information, critically assess data, and contribute to the body of knowledge in your field.

CONCLUSION

This chapter serves as the final section of your research document, summarizing and synthesizing the key points, findings, and implications of your study. It offers a sense of closure and provides a clear and concise overview of the entire research project.

6.1 CONSIDERATION

Here's what should be included in the conclusion chapter:

1. **Summary of Key Findings:** Begin by summarizing the main findings and results of your research. Highlight the most significant and relevant outcomes of your study.
2. **Restate the Research Problem:** Remind the reader of the specific research problem or questions that your study aimed to address. Restate them clearly and concisely.
3. **Review of Research Objectives:** Recap the research objectives and goals you set out to achieve at the beginning of your thesis. Explain whether you have met these objectives.
4. **Contributions to Knowledge:** Discuss the contributions your research has made to the field. Emphasize the novel insights, advancements, or new knowledge generated by your study.
5. **Theoretical and Practical Implications:** Explain the theoretical and practical implications of your research. How does your work impact the theoretical understanding of the topic, and what are its real-world applications?
6. **Limitations:** Acknowledge any limitations or constraints in your study, and discuss how they may have influenced the results or the generalizability of your findings.
7. **Reflection on Methodology:** Reflect on the research methods and methodology used in your study. Discuss the strengths and weaknesses of your approach and any lessons learned for future research.

8. **Future Directions:** Offer suggestions for future research that could build upon your work. Identify specific areas or questions that remain unanswered or require further investigation.
9. **Practical Recommendations (if applicable):** If your research has practical applications, provide recommendations for policymakers, practitioners, or relevant stakeholders based on your findings.
10. **Personal Reflection (optional):** Some researchers choose to include a brief personal reflection on the research process, discussing their own growth, challenges, and insights gained during the study.
11. **Final Thoughts and Closing Remarks:** End the conclusion chapter with a compelling final thought or statement that leaves a strong impression on the reader and summarizes the significance of your research.

6.1.1 *Summary*

The conclusion chapter should be concise and focused while still providing a comprehensive overview of the study's major elements. It should leave the reader with a clear understanding of the research's importance, the contributions it has made, and the potential for future research in the field.

6.2 NOT AN ABSTRACT

The abstract and the conclusion chapter of a Ph.D. thesis serve different purposes and are placed at different points within the document. Here are the key differences between an abstract and the conclusion chapter:

Content

An abstract serves as a condensed summary of the research, highlighting the key aspects of the thesis, including the research problem, objectives, methods, key findings, and conclusions. It does not provide in-depth details.

The conclusion chapter is where the researcher interprets the results, discusses their implications, summarizes the major findings, reflects on the research process, and provides recommendations for further study or practical applications.

Audience

The abstract is designed to give potential readers a quick understanding of the thesis's content, allowing them to decide whether they want to read the full document. It is often used as a reference when searching for relevant research.

The conclusion chapter is intended for readers who have read the entire thesis and are looking for a thorough understanding of the research's significance and implications.

Use

The abstract is useful for busy researchers who want to assess the relevance of the thesis to their own work or for readers seeking a quick overview of the research without delving into the entire document.

The conclusion chapter is an integral part of the thesis, allowing the researcher to demonstrate their critical thinking and synthesis of the research. It is where the researcher has the opportunity to tie together all the threads of the study and leave the reader with a comprehensive understanding of the research's impact and future directions.

Last Section

In summary, while both the abstract and the conclusion chapter provide summaries of a Ph.D. thesis, the abstract is a brief, initial overview intended for a broad audience, while the conclusion chapter is a more detailed and comprehensive analysis and reflection, serving as the closing section for those who have read the entire document.

REFERENCES

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- [3] ABB AB. <https://new.abb.com/>, site accessed – 11 December 2018.

