Issues and Strategies for Preparing Quality PhD Thesis

P. Sanjeeva Rao
Advisor (R&D)
KONERU LAKSHMAIH EDUCATION FOUNDATION
(K L deemed to be UNIVERSITY)

Email: psanjeevarao@klunivaersity.in
psanjeevarao@yahoo.com

`Doctor of Philosophy (PhD)'
Essential Ingredients to Award the Degree

- **Address One of the Emerging S&T issues, of Societal Relevance**

- **Technical Merit, Novelty, Feasibility and Innovation in Approach**

- **Potential Contribution towards Advancement of the National S&T Ecosystem.**

Essential Requirements

- **Assess Your Strength / Expertise**

- **Identify an Issue of Contemporary Value**

- **Acquiring Technical Knowledge Skills**

- **Interaction and Discussions with the Groups already working on the issue**

Format for PhD Thesis

- Title of the Thesis
- Executive Summary

Ch-1: Introduction

Ch-2: Literature Review
- International, National & Internal Expertise
- Objectives

Ch-3: Data and Methodology

Ch-4: Results and Discussion

Ch-5: Conclusions and Societal Benefits

Ch-6: Future Direction

- References
- List of Publications

Title of the PhD Thesis

- **Neither Too Lengthy Nor Too Short**

- **Informative, Impressive and Inclusive**

- **Convey the Innovation in this Study**

- **Provide Curiosity to the Peers.**

Title of PhD Thesis - Examples

- **Design and Realization of Conformal Array Antenna with Reconfigurability for Ku- and Ka-band on-the-move applications.**

- **An Improved Framework for Implementation of `Advanced Security' through Multi-access Control and Aggregate Crypto System in Cloud Computing.**

- **Design, Synthesis and In-vitro Studies of Noval Thiophene and 6-Azauracil derivatives as a Potent Biological Agents**

- **On Some Existence and Uniqueness Solutions in Various Metric Spaces.**

- **Fatigue Analysis of Friction Welded Notched Marine Steels.**

- **Competency Model for Emergency Relief Workers: A Study of Select Organizations in India.**

Introduction to Thesis

- **What is the Research Problem / Question being Investigated?**
- **Known or Previous Studies that have Addressed this Problem**
- **Recognized Deficiencies in the Studies**
- **How Significant - this Investigation in the Contemporary World**
- **Finally the Scope or Statement of Purpose (SOP)**

Attributes Associated with the Statement of the Problem

- **Clarity and Precision**
- Identification of What to Investigate or an Overarching Question
- **Definition of Key Concepts / Terms**
- **Articulation of Study's Boundaries / Parameters**
- **Convey Study's Importance, Benefits, and Justification**
- **No Usage of Unnecessary Jargon of Words**
- "Snapshot" of your Understanding.

Acquire and Update S&T Knowledge Skills

(Local, National & International Literature Review)

- Review of Literature on the Topic / Issue
- Update Knowledge Skills on Methodological Issues (Theoretical or Experimental or Fieldwork / Survey)
- Analyze all Published Debates on the Issue
- Find Holes / Gaps
  - Cite   - Compare
  - Contrast   - Critique
  - CONNECT.

Objectives of the Thesis

- **List out Research Questions being Investigated**

  – **Precise, Clear and Sharp**

  – **Should be Action-oriented**

  – **Quantifiable and Relates to Identified Issues**

    Not Exceeding Four (4) Objectives --

    Connecting to the Title of the Thesis.

Methodology – How to Execute

- **Research Design, Purpose and Selection**

- **Kind of Data being Accessed or Generated**

- **Data Collection Procedures / Experiments**

- **Quantifiable Work Elements**

- **List of Actionable Items**

- **Detailed Time Schedule or Action Plan**

Strategic Work Plan – Zero Review: 06 m
(Selection of Research Topic and Pre-PhD)

Work Elements

- Identification of Major Areas for Research
- Initiate Review of Existing Knowledge
- Registration for Pre-PhD Course Work.
- Report Preparation

Targets

- Finalize Core Area of Research
- Identify Research Gaps
- Key Issues to Study
- List of Major Activities
- Attend Pre-PhD Exams.

Work Plan – First Review: 12 m
(Methods / Techniques and Pre-PhD)

Work Elements

- **Exhaustive Literature Survey**
- **Identify the Latest and Most Appropriate Techniques**
- **Data Requirements to Implement the Identified Techniques / Methods**

  (Experiments / Databases / Source of Software Tools)

- **Report Preparation**

Targets

- **Analyze Known Technical Overview Papers**
- **Finalization of KEY Issues**
- **Completion of all Course Work and Pre-PhD Examinations**
- **Ethical Clearance**
- **Dept. Review for Continuation of PhD.**

Work Plan – Second Review: 18 m
(Design of Experiments / Methodology)

Work Elements	Targets
• **Design of Experiments / Algorithms**	• **Bugs Identification and Fine-tune Methodology**
• **Preliminary Data Generation**	• **Organize Experiments / Data Sources & Develop Algorithms to Address the Objectives**
• **Identification of Methodological Issues**	• **Analysis of Data to Find Solution to First Objective**
• **Updating Knowledge on Data Generation & Analytical Techniques**	• **Draft for First Paper for journal Publication (SCI)**
• Report Preparation	• **Review by DC/RPAC**

Work Plan – Third Review: 24 m
(Experiments / Methods / Algorithms)

Work Elements

- Continuation of Experiments / Algorithms
- Required Data Generation
- Resolving Methodological Issues
- Updating Literature on Data Sourcing and Analytical Tools.
- Report Preparation.

Targets

- **Continue the Experiments / accessing Data Sources & implementing Algorithms to Achieve Second Objective.**
- **Analysis of data to address the Second Objective**
- **Draft for Second Paper for journal publication (SCI)**
- **Publication of One Paper**
- **Third Review by DC/RPAC.**

Work Plan – Fourth Review: 30 m
(Design of Experiments / Testing of Methods)

Work elements

- **Continue the Experimental and Theoretical Analysis**
- **Attend the Comments of Research Articles**
- **Participation in an International Conference on the Domain Knowledge**
- **Report Preparation**

Targets

- **Organize Experiments, Test and Validate Algorithms to Meet other Objectives**
- **Analysis of Data to Address the 3 & 4 Objectives**
- **Draft for Third paper for Publication (SCI)**
- **Sharing the Results to the Scientific / Engineering Fraternity.**
- **Review by DC/RPAC**

Work Plan – Fifth Review: 36 m
(Experimentation / Data Analysis)

Work elements

- **Analysis of Data and Identify the Significant Results**

- **Attend the Reviewer Comments on the Journal Publications**

- **Validation of the New Results and their Interpretation.**

- **Report Preparation**

Targets

- **Analysis of data to Address all the Objectives**

- **Synthesis and Integration of the Results Achieved**

- **Draft for Fourth paper for journal Publication (Scopus / WoS)**

- **Prepare the draft Synopsis for Circulation**

- **Review by DC / RPAC.**

Sixth/Departmental Review:42 m
(Drafting Thesis and Synopsis)

Work Elements

- **Consolidation of Results and interpretation with respect to the Objectives and Justify the Title of the PhD Thesis**
- **Identify the limitations**
- **List out the possible studies beyond the scope of this Thesis**
- **Attend the comments of the Paper Reviewers**
- **Preparation of Draft Synopsis**

Targets

- **Complete all the Technical and Administrative Requirements for Thesis Submission**
- **Prepare the draft Thesis**
- **Editing for English Language**
- **Finalize the Synopsis**
- **Ready for Departmental Talk.**

Submission of PhD Thesis : 48 m
(Final Checks and Balances)

Work elements	Targets
• **Address all the Comments of the Reviewers / Advisory Committee's**	• **Complete Synopsis Pre-Talk**
• **Read the Thesis Carefully for Clarity, Continuity and Finally Address all the Objectives Systematicaly.**	• **Finalize Draft Thesis, after Plagiarism Testing**
• **Check the Conclusions and References**	• **Complete all Requirements for Thesis Submission (No-dues Certificate)**
• **One-page `Brief for SOCIAL Media' for Societal Outreach**	• **Submission of Thesis for Adjudication by Domain Knowledge Experts**
	• **Preparation for Viva-voce Examination.**

Finer Tips for Quality PhD

- **Selection of the Problem, of Highest Relevance, & Societal Benefit**
- **Interaction with Guide and other Colleagues at the University and Industry / Peers**
- **Maintain Log-book to Record the Day-to-day Activities – Great Help in Interpretation of Results**
- **Reading and Synthesis of all Relevant Journal Publications for Enriching your Knowledge Base**
- **Apply Innovative Techniques / Tools to Generate, Analyze & Interpretation of Results .**

Tips for Quality PhD (Cont.)

- **Follow Ethics in Data, Interpretation and Publications**

- **Networking of Scientists/ Engineers Working in your Domain Knowledge**

- **Share Acquired Knowledge at Various Forums**

- **Publish in Good SCI Journals and Registration of Patents**

- **Scientific Social Responsibility.**

Summary Remarks

- **Chose an Unique Idea for PhD Program**

- **Clarity and Innovation in the Research Methodologies to Achieve the Objectives**

- Convince Yourself About:
  - **CREDIBILITY - above 25 Citations**
  - **PRACTICALITY – Societal Benefits**
  - **REPEATABILITY and REPRODUCABILITY of RESULTS – Confidence about Original Research**
  - **Significant Contribution to Chosen Domain Knowledge.**