MARE -Marine Coastal and Delta Sustainability for Southeast Asia

Methodological guidelines on research and supervision post-graduated students (MSc and PhD Students)
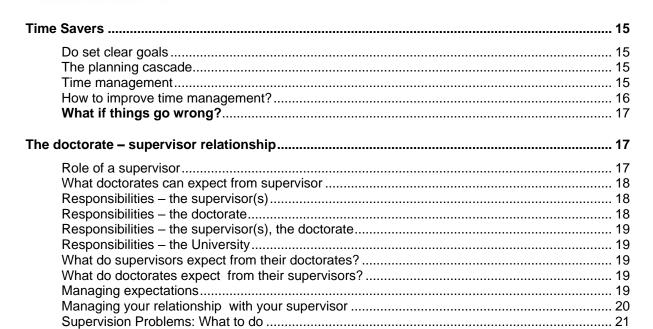
MARE -Marine Coastal and Delta
Sustainability for Southeast Asia

Contents

1. Introduction

1.1 What research is?

"…the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon about which we are concerned or interested."[1]

1.2 Research Characteristics

1. Originates with a question or problem.
2. Requires clear articulation of a goal.
3. Follows a specific plan or procedure.
4. Often divides main problem into sub-problems.
5. Guided by specific problem, question, or hypothesis.
6. Accepts certain critical assumptions.
7. Requires collection and interpretation of data.
8. Cyclical (helical) in nature.

1.3 Research Projects

❑ Research begins with a problem.
  ▪ This problem need not be earth-shaking.
❑ Identifying this problem can actually be the hardest part of research.
❑ In general, good research projects should:
  ▪ Address an important question.
  ▪ Advance knowledge.

The concept of "important" questions is subjective and will depend on who you ask as well as the purpose of the research.

1.4 Research Project Pitfalls

❑ The following kinds of projects usually don't make for good research:
  ▪ Self-enlightenment.
  ▪ Comparing data sets.
  ▪ Correlating data sets.
  ▪ Problems with yes / no answers

1.5   High-Quality Research

❑ Good research requires:
  ▪ The scope and limitations of the work to be clearly defined.
  ▪ The process to be clearly explained so that it can be reproduced and verified by other researchers.
  ▪ A carefully planned design that is as objective as possible.
  ▪ Highly ethical standards be applied.
  ▪ All limitations be documented.
  ▪ Data be adequately analyzed and explained.
  ▪ All findings be presented unambiguously and all conclusions be justified by sufficient evidence.

If other researchers can't confirm your results, you may be faced with having studied an anomaly. Similarly, without a solid plan, you might have inadvertently introduced errors into the experimental design which immediately calls your results into question. There are very few "perfect" research designs where some shortcomings aren't present. However, these pittfalls must be documented as well as their possible impact on the outcome. While this won't stop reviewers from criticizing the work, it makes it clear that you are aware of the problems and their impact upon your work.

2.   Components of Research

2.1 Stating the Research Problem

❑ Once you've identified a research problem:
  ▪ State that problem clearly and completely.
  ▪ Determine the feasibility of the research.
❑ Identify subproblems:
  ▪ Completely researchable units.
  ▪ Small in number.
  ▪ Add up to the total problem.
  ▪ Must be clearly linked to the interpretation of the data.

When documenting the proposed research, you should be as precise as you can. You'll probably find yourself editing and revising many times to attain the necessary level of precision and clarity.

2.2 Hypotheses

❑ Hypotheses are tentative, intelligent guesses as to the solution of the problem.
  ▪ There is often a 1-1 correspondence between a subproblem and a hypothesis.

- ▪ Hypotheses can direct later research activities since they can help determine the nature of the research and methods applied.

2.3 Delimitations

- ❑ All research has limitations and thus certain work that **will not** be performed.
- ❑ The work that will not be undertaken is described as the *delimitations* of the research.

Documenting the delimitations is just as important as documenting the intended research. In essence, the problem and delimitations describe the scope of the project. Keep the delimitations in mind as you move forward. Current delimitations might provide avenues for valuable future work.

2.4 Definitions

- ❑ Define each scientific or technical term as it is used in relation to your research project.
- ❑ This helps remove significant ambiguity from the research itself by ensuring that reviewers, while they may not agree with your definitions, at least know what you're talking about.
- ❑ Ex: environment, time scale

2.5 Assumptions

- ❑ Assumptions are those things that the researcher is taking for granted.
  - ▪ For example: a given test instrument accurately and consistently measures the phenomenon in question.
- ❑ As a general rule it is better to document an assumption than to ignore it.
  - ▪ Overlooked assumptions provide a prime source of debate about a research project's results.

The accurate and consistent measurement of some phenomenon is called *validity* and *reliability* respectively.

2.6 Importance of the Study

- ❑ Many research problems have a kind of theoretical feel about them. Such projects often need to be justified:
  - ▪ What is the research project's practical value?
  - ▪ Academic level
  - ▪ Economical significance
  - ▪ Ethics

Without this justification, it will prove difficult to convince others that the problem in question is worth study.

2.7 Research Proposals

❑ Research proposals are documents that describe the intended research including:
- Problem and subproblems.
- Hypotheses.
- Delimitations.
- Definitions.
- Assumptions.
- Importance.
- Literature review.

2.8 Literature Review

❑ A literature review is a necessity.
- Without this step, you won't know if your problem has been solved or what related research is already underway.

❑ When performing the review:
- Start searching professional journals.
- Begin with the most recent articles you can find.
- Keep track of relevant articles in a bibliography.
- Don't be discouraged if work on the topic is already underway.

2.9 Literature Review Pitfalls

❑ Be very careful to check your sources when doing your literature review.
❑ Many trade magazines are not peer reviewed.
- Professional conferences and journals often have each article reviewed by multiple people before it is even recommended for publication.
- The ISI and CAB digital libraries are good places to start looking for legitimate research.

❑ The Internet can be a good source of information. It is also full of pseudo-science and poor research.
❑ Make sure you verify the claims of any documentation that has not been peer reviewed by other professionals.

3.

4.   Research Process

❑ Research is an extremely cyclic process.
❑ Later stages might necessitate a review of earlier work.
❑ Because of the cyclic nature of research, it can be difficult to determine where to start and when to stop.
❑ This isn't a weakness of the process but is part of the built-in error correction machinery.
❑ several steps…..

4.1   Step 1: A Question Is Raised

❑ A question occurs to or is posed to the researcher for which that researcher has no answer.
❑ This doesn't mean that someone else doesn't already have an answer.

The question needs to be converted to an appropriate problem statement like that documented in a research proposal

4.2   Step 2: Suggest Hypotheses

❑ The researcher generates intermediate hypotheses to describe a solution to the problem.
❑ This is at best a temporary solution since there is as yet no evidence to support either the acceptance or rejection of these hypotheses.

4.2.1   Step 3: Literature Review

❑ The available literature is reviewed to determine if there is already a solution to the problem.
❑ Existing solutions do not always explain new observations.
❑ The existing solution might require some revision or even be discarded.

The literature review is often a good source for additional ideas. This is also a good place to go in conjunction with the prior step. There is no point in wasting good brain cells coming up with hypotheses that solve a problem that has already been adequately addressed

4.2.2   Step 4: Literature Evaluation

❑ It is possible that the literature review has yielded a solution to the proposed problem.

❑ This means that you have not really to do a research.
❑ On the other hand, if the literature review turns up nothing, then additional research activities are justified.

Keep in mind that just because you did not find a solution today, does not mean that one will not show up tomorrow. This is one of the reasons that researchers are always reading and trying to keep up to date with current trends.

4.2.3 Step 5: Acquire Data

❑ The researcher now begins to gather data relating to the research problem.
❑ The means of data acquisition will often change based on the type of the research problem.
❑ This might require only data gathering, but it could also require the creation of new measurement instruments.

4.3 Step 6: Data Analysis

❑ The data that were gathered in the previous step are analyzed as a first step in ascertaining their meaning.
❑ As before, the analysis of the data does not constitute research.

4.4 Step 7: Data Interpretation

❑ The researcher interprets the newly analyzed data and suggests a conclusion.
❑ This can be difficult.
❑ Keep in mind that data analysis that suggests a correlation between two variables can not automatically be interpreted as suggesting causality between those variables.

A statement of causality is very difficult to demonstrate because there often many other confounding factors.

4.5 Step 8: Hypothesis Support

❑ The data will either support the hypotheses or they will not.
❑ This may lead the researcher to cycle back to an earlier step in the process and begin again with a new hypothesis.
❑ This is one of the self-correcting mechanisms associated with the scientific method.

MARE -Marine Coastal and Delta Sustainability for Southeast Asia

5. Methodologies of research

5.1 Common Methodologies

- ❑ Methodologies are high-level approaches to conducting research.
- ❑ The individual steps within the methodology might vary based on the research being performed.
- ❑ Two commonly used research methodologies:
    - ▪ Quantitative.
    - ▪ Qualitative.

The hard sciences tend to favor quantitative methodologies whereas the social sciences often gravitate toward qualitative approaches. It's quite common for both methodologies to be used during the course of a single research project.

5.2 Methodology Comparison

Quantitative

- ❑ Explanation, prediction
- ❑ Test theories
- ❑ Known variables
- ❑ Large sample
- ❑ Standardized instruments
- ❑ Deductive

Qualitative

- ❑ Explanation, description
- ❑ Build theories
- ❑ Unknown variables
- ❑ Small sample
- ❑ Observations, interviews
- ❑ Inductive

There are other significant differences in approach as well, but these are some of the highlights. Keep in mind that research design is not a simple task.

References

1. Leedy P. D. and Ormrod J. E., <u>Practical Research: Planning and Design, 7th Edition</u>. 2001.
2. http://computer.org

3. http://www.acm.org

6. Researcher

6.1 What is a researcher ?

❑ 'Professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned.'
❑ More specifically, this recommendation relates to all persons professionally engaged in R&D at any career stage, regardless of their classification.
❑ This includes any activities related to:

- ▪ 'basic research',
- ▪ 'strategic research',
- ▪ 'applied research',
- ▪ experimental development
- ▪ 'transfer of knowledge

6.2 Definations

Research and experimental development (R&D) - creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications.

❑ **Basic research**

- ▪ Theoretical or experimental work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view;

❑ **Applied research**

- ▪ original investigation undertaken in order to acquire new knowledge directed primarily towards a specific practical aim or objective;

❑ **Experimental development**

- ▪ Systematic work drawing on existing knowledge gained from basic or applied research which is directed to producing new or substantially improved materials, products, devices, to installing new or substantially improved processes, systems and services.

6.3 The activities of a scientist (Research, Transfer, Animation)

- ❑ Scientific production (Research)
- ❑ Scientific expertise and advices (Transfer)
- ❑ Technical assistance (Transfer)
- ❑ Scientific information and participation to public debates (Animation)
- ❑ Training and teaching (Animation)
- ❑ Scientific community-based activities and research management (Animation)

7. European Charter for Researchers

On 11 March 2005, the European Commission has adopted and a Code of Conduct for the Recruitment of Researchers.

- ❑ These two documents are key elements in the EU's policy to make research an attractive career, which is a vital feature of its strategy to stimulate economic and employment growth.
- ❑ The Charter and Code of Conduct will give individual researchers the same rights and obligations wherever they may work throughout the EU.
- ❑ This should help counter the fact that research careers in Europe are fragmented at local, regional, national or sectoral level, and allow Europe to make the most of its scientific potential.

7.1 European Charter for Researchers

- ❑ Address the status of researchers to ensure that they, wherever they work, are treated with the respect and esteem they deserve.
- ❑ Contribute to this objective by addressing Member States, employers, funding organisations and researchers at all career stages.
- ❑ Cover all fields of research in the public and private sectors, irrespective of the nature of the appointment or employment, the legal status of the employer or the type of organisation or establishment in which the work is carried out.
- ❑ Addresses the roles, responsibilities and entitlements of researchers and their employers or funding organisations.
- ❑ Ensures that the relationship between these parties contributes to successful performance in the generation, transfer and sharing of knowledge, and to the career development of researchers.

7.2 The Code of Conduct for the Recruitment of Researchers

- ❑ To improve recruitment, to make selection procedures fairer and more transparent and proposes different means of judging merit.
- ❑ Merit should not just be measured on the number of publications but on a wider range of evaluation criteria, such as teaching, supervision, teamwork, knowledge transfer, management and public awareness activities.

8. Organizing work and time

"...**it is mainly through the control of time that academic power is exerted.**" Pierre Bourdieu, sociologist, 1930-2002

8.1 The PhD thesis work

In three to four years (PhD) you need to:

1. Plan a PROGRAM of research
2. Conduct that research
3. Write up and submit a thesis documenting the research

Have a plan *from the very beginning*

8.2 General keys for the success

- ❑ Identify key stages of the research project and organise them into a time table.
- ❑ Set deadlines (for yourself, or with your supervisor) and try to stick to these:
    - ❑ Most things take longer than you anticipate.
- ❑ Monitor your own progress
    - ❑ This will help you to keep things in perspective
    - ❑ This will help you become more independent

8.3 Achievement of dreams

It's no use having dreams if they don't have dates and time-frames…", *Dr. Phil McGraw (TV psychologist).*

9.   Time Savers

- ❑ ORGANISE FIRST
  - ❑ It will save time in long run
    Think carefully about the materials, apparatus, skills,
    resources, people you need to help get your project done
- ❑ Run activities concurrently
- ❑ Keep records
  - ❑ Of ideas, analyses, key articles etc
  - ❑ Think about tools that might help e.g., endnote
- ❑ Write as you go.

9.1   Do set clear goals

- ❑ You can do anything, but you can't do everything
- ❑ "A sufficiently clear intention produces the resources to make it happen" (David Allen)
- ❑ You will find it easier to say "no," if you have clear goals in mind.

9.2   The planning cascade

- ❑ Lifelong: Mission and priorities
- ❑ This phase of your life: goals
- ❑ This year: objectives & projects
- ❑ This week
- ❑ Today

9.3   Time management

- ❑ What is going wrong?

Loss of time and activities preventing achievement of objectives.

- ❑ Some reasons:
- ❑ Lack of objectives and deadlines
- ❑ Disorganisation
- ❑ Poor communication, Lack of information
- ❑ Postponing, Never finishing tasks
- ❑ Can't say 'No'
- ❑ Lack of self-discipline
- ❑ The unforeseen crisis

❑ Socializing too much or not enough

9.4 How to improve time management?

❑ Prioritize and plan
❑ Differentiate the difference between urgent and important!

   ▪ whether it is helping to achieve the aims of your PhD
   ▪ if not, should it be done?

❑ DO – *task list shorter as better in time management*
❑ DELAY - briefly when dealing with the DO box
❑ DELEGATE - or dump and see how important it was
❑ DUMP - even if you want to do it!

How to improve time management?

❑ Clear objectives. Knowing the aims of the research clarify the objectives
❑ Make and stick to deadlines
❑ Don't confuse urgency with importance
❑ Devote time to planning
❑ Use a diary and timetable key activities
❑ Don't get bogged down by others. Manage other people's expectations and make your priorities clear to them
❑ Do one thing at a time
❑ Review an activity before you leave it
❑ Clear objectives. Knowing the aims of the research clarify the objectives
❑ Make and stick to deadlines
❑ Don't confuse urgency with importance
❑ Devote time to planning
❑ Use a diary and timetable key activities
❑ Don't get bogged down by others. Manage other people's expectations and make your priorities clear to them
❑ Do one thing at a time
❑ Review an activity before you leave it
❑ **Agree a general timeline with the supervisor. What is expected after:**
    ❑ 6 months: survey literature and learn to use relevant tools?
    ❑ 12 months: deeper understanding of the 'problem' and devise solutions?
    ❑ 18 months: HALFWAY! immerged in research
    ❑ 24 months: begin to wind up data collection?
    ❑ 30 months: complete solution and review recent literature?
    ❑ 36 months: written thesis, ready for viva?

9.5

9.6   What if things go wrong?

- ❑ *TRAINING to be a researcher and things will go wrong.*
- ❑ **Reviewing what happened:**

    - ❑ Try to achieve too much?
    - ❑ Ready to do the task?
    - ❑ Was the task clear?
    - ❑ Was it difficult to decide what to do?
    - ❑ Have all the information needed to do the task?
    - ❑ Plan the task badly because of pressure?
    - ❑ Failure because it was boring or too difficult?

10.   The doctorate – supervisor relationship

- ❑ The supervisory relationship is at the heart of research higher degrees.
    - ❑ As with any important relationship, there needs to be some match:
- ❑ In interest, approach, 'personality'
    - ❑ As with other relationships, supervision is partly organic and partly good design.

10.1 Role of a supervisor

- ❑ Different approaches: talk and understand
- ❑ Shared aims and expectations?
- ❑ Career and responsibilities: supervision style
- ❑ Can you identify someone who is:
    1. Interested in your research?
    2. Available to discuss your conclusions and ideas?
    3. Able to provide feedback on your progress, on your written work?
    4. Encouraging you to participate in group meetings, seminars and occasional conferences?
    5. Developing your professional research qualities by example?
    6. An expert in a field *related* to your interest. Not an expert in your field, that's you!
    7. An active researcher. Somebody who has an established record and who is currently producing research.
    8. A busy academic. Somebody who supervises other postgraduates, teaches undergraduates, carries out administrative duties within the university.

10.2 What doctorates can expect from supervisor

- ❑ Early direction. Initial project formulation and plan.
- ❑ Exposure to all elements of research training.
- ❑ Advice on reformulation of goals and plans
- ❑ Positive feedback on research proposals. Interest in what they are doing and why.
- ❑ Criticism if fail to meet professional research standards.
- ❑ Meetings as requested by doctorate and supervisor.
- ❑ Support and encouragement in time of research, financial or personal crisis**.**

10.3 Responsibilities – the supervisor(s)

- ❑ Behave in professional, supportive manner, **make doctorates aware of expectations.**
- ❑ Training expertise is available.
- ❑ Facilities are available.
- ❑ Ensure and monitor progress – practical and intellectual; if not deal with problems soon.
- ❑ Complete work and submission within agreed deadlines.
- ❑ Encourage and foster research links for the doctorate within and outside the University.
- ❑ With the doctorate, make sure publishable work is submitted to good quality journals.
- ❑ Personal and professional support, career guidance.

10.4 Responsibilities – the doctorate

- ❑ Diligent academic performance.
- ❑ Commitment to the work and project.
- ❑ Understanding the regulations.
- ❑ **A significant contribution to knowledge.**
- ❑ Contribute to the life of the University.
- ❑ Maintain, even enhance, the reputation of the University.
- ❑ Meet deadlines, meet with the supervisor as required, and produce.
- ❑ Get to know the 'Structured Management Framework'.
- ❑ Establish and maintain highest possible standard of work and reporting.
- ❑ Establish and maintain general and specific reading, attend seminars.
- ❑ Attend any appropriate courses.
- ❑ Complete practical work and submission within agreed and acceptable guidelines.

10.5 Responsibilities – the supervisor(s), the doctorate

The first 12 months are vital: doctorates need close attention from supervisor(s) during this period. Therefore:

- ❑ Ensure good lines of communication.
- ❑ Establish clear objectives.
- ❑ Establish clear standards of work.
- ❑ Make sure that any problems can be raised in a non-threatening atmosphere**.**

10.6 Responsibilities – the University

- ❑ Provide support structure.
- ❑ Provide framework for monitoring.
- ❑ Provide resources (space, computers, etc).
- ❑ Act upon any problems (doctorate and/or supervisor) in formal, predefined way.

10.7 What do supervisors expect from their doctorates?

- ❑ Independence and initiative
- ❑ Professionalism
- ❑ Responsiveness
- ❑ Enthusiasm
- ❑ Product - You finish
- ❑ You go on to supervise
- ❑ Your drafts lack spelling mistakes!!!!!

10.8 What do doctorates expect from their supervisors?

- ❑ Intellectual support
- ❑ Detailed feedback
- ❑ Availability
- ❑ Constructive criticism
- ❑ Detailed knowledge
- ❑ A helping hand
- ❑ Emotional support
    - ❑ Encouragement
    - ❑ Constructive environment

10.9 Managing expectations

- ❑ Most of these expectations are reasonable (although some more so than others).
- ❑ Problems arise when people have *different* understandings of what these things mean.
- ❑ The solution is to calibrate expectations.

- ❑ Discuss what your general expectations are and what your supervisor expects in return.
- ❑ Discuss how things are going to work in a practical sense.
- ❑ Negotiate a timetable of meetings:
- ❑ Keep communication flowing.
- ❑ Be honest with your supervisor.
- ❑ Keep communication open.

10.10   Managing your relationship with your supervisor

- ❑ Good management by both parties to be successful.
- ❑ Not uncommon for misunderstandings to arise between postgraduate researcher and supervisor during the course of the PhD.
- ❑ Always remember that your supervisor shares an important goal with you - the successful completion of your degree.
- ❑ Inform them
  - ❑ Scientific obstacles
  - ❑ Personal obstacles
- ❑ Be positive
  - ❑ Your supervisor is more likely to want to help
  - ❑ You'll feel better
- ❑ Work hard
  - ❑ They will be more willing to work hard too
  - ❑ You'll more likely to get results
  - ❑ A thesis is hard work
- ❑ Write
  - ❑ Internal notes
  - ❑ Conference papers
  - ❑ Journal articles
  - ❑ They will find it hard to ignore paper
- ❑ Be their ambassador
  - ❑ Scientific contacts
  - ❑ Social networking
- ❑ Make yourself invaluable
  - ❑ Reviewing papers
  - ❑ Helping run conferences
  - ❑ Running events/groups
- ❑ **Be independent:**
  - ❑ You can think for yourself
  - ❑ set your objectives
  - ❑ produce project plans
  - ❑ analyse your findings
- ❑ **Arrange formal supervisory meetings:**
  - ❑ many constraints on the supervisor's time.
  - ❑ use his time efficiently and take the initiative by arranging meetings
- ❑ **Plan for meetings**

- ❑ what you want to discuss, information in advance
- ❑ discuss results (thinking in advance)
- ❑ present ideas and hypotheses
- ❑ write a record with a copy to supervisor
- ❑ **Be honest, the PhD is a period of TRAINING**
  - ❑ gain the respect of your supervisor
  - ❑ the difficulties help you
- ❑ **Following supervisor's advice:**
  - ❑ challenge suggestions with your own
  - ❑ never ignore advice
- ❑ **Don't wait to be told**
  - ❑ invite feedback rather than waiting to be criticised.
  - ❑ Am I doing enough research? Are these results credible? Am I planning my work effectively? Am I using the literature appropriately?
- ❑ **Show that you are enjoying research**
  - ❑ PhD: part of supervisor's research portfolio
- ❑ **Meet deadlines**
  - ❑ planning the work
  - ❑ time and resources to meet deadlines
  - ❑ particularly those set by the supervisor

10.11 Supervision Problems: What to do

- ❑ Communicate
  - ❑ Conflict often caused by breakdowns in communication
- ❑ Compromise
  - ❑ There are two of you in this "marriage"
- ❑ Speak to your second supervisor
- ❑ Approach a colleague of theirs
- ❑ Find your graduate officer
- ❑ If all else fails, you can "change" your supervisor
  - ❑ Formally or informally
  - ❑ doctorate funding may be an issue
- ❑ Your supervisor is your "best" friend
  - ❑ Getting your next job
  - ❑ Getting the Postdoctoral Fellowship
  - ❑ Your success is their success
- ❑ Unlike a marriage, they expect (and want) you to leave
  - ❑ To see you stand on your own feet and be independent researcher
  - ❑ More like having children?

MARE -Marine Coastal and Delta
Sustainability for Southeast Asia