RESEARCH METHODOLOGY

PROBLEM FORMULATION

By

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At the end of the session, participants will be able to

• Identify elements of good problem statement
• Analyses a problem statement (an approach)
• Develop a basic problem statement
PROBLEM FORMULATION

What is a problem formulation in a report?

A report is meant to investigate a specific problem.

Investigate means solve, analyze, discuss, interpret, estimate.
What is Problem Formulation?

- A problem formulation is/can be a question or something you are wondering about.
- The problem should be something you can solve/give answers to.
- A conclusion in a report is always the answer to the problem formulation.
PROBLEM FORMULATION

Different types of problem formulation

"What" - descriptive
is what you call a descriptive problem formulation - it describes a problem!

"Why" - explanatory
is the explanatory problem formulation - it wants to explain a problem!

"How" - normative
is the normative problem formulation - it tries to solve a problem!
PROBLEM FORMULATION

What is a good problem formulation?

- Interesting - keeps the researcher involved in it throughout the research process
- Researchable - can be investigated through the collection and analysis of data, using case study or other techniques
- Understandable and logically build up - well formulated and has logical structure with main question and following sub-questions
- Manageable - fits the level of researcher’s level of research skills, needed resources, and time restrictions
- Purposeful - establishes cooperation between researcher and business which should lead to economical and practical development of both sides
Why is a good problem formulation important?

- Formulating a Problem formulation is the first and most important step of a research process.
- The problem formulation is like an identification of a destination before undertaking a journey.
- The research problem serves as a foundation of a research study; like a building and its foundation.
- If it is well formulated, you can expect a good study to follow.
How to set up a problem formulation?

- **Step 1: Choose a area/topic**
  - Your own interest is your most essential motivational factor (Andersen, 2005)
  - Brainstorm techniques
  - Be creative, be open to new ideas
  - Quantity

- **Step 2: Narrowing down**
  - Be critical
  - Determine whether the information already exists
  - Choose a subject
  - Think: what is the problem, why is it a problem, and who is it a problem for? (Andersen, 2005)
  - Divide the broad area into sub areas
PROBLEM FORMULATION

How to set up a problem formulation?

- **Step 3: Write the problem formulation**
  - Raise research questions + sub questions
  - Understandable language
  - Clearly delimited
  - Determine whether the question can be answered

- **Step 4: Double check**
  - Check everything (main question, sub questions)
  - Ask yourself the question if you are satisfied with your problem formulation
  - Remember in any case to always justify why you choose exactly the problem formulation you do, rather than other possible problem formulations
PROBLEM FORMULATION

Writing the First Draft and Creating an Introduction.

- try to formulate an introduction in each part that asserts a straightforward thesis

- the introduction:
  - establishes the focus of your subject
  - attracts the attention of your readers
  - asserts the purpose of your paper
DO YOU KNOW WHEN YOU SEE A PROBLEM?

Looking at a problem

Seeing a problem
Motivation

- Writing a clear problem statement to define and guide an inquiry is a PROBLEM.
- The issue of how to write a problem statement becomes important.
- Defining a research problem is the driving factor in any scientific process, and is the foundation of any research method and experimental design, from true experiment to case study.
Common Steps in Conducting Research

- Real World Phenomenon
- Background and Theory
- Choosing Design and Method
- Data Collection
- Test or Observe in Specific Situation (Measurement or Experimental)
- Results
- Statistical Analysis
- Discussion
- Conclusion
- Questions about the big picture
- Concepts, Literature Review, Causal Explanations
- Hypothesis, Prediction, Operationalization
- Test Hypothesis, Describe
- Implications, Possible bias/errors?
- Generalization, Future Research?
In developing a problem statement, consider the followings:

• Do I know the field and its literature well?
• What are the important research questions in my field?
• What areas need further exploration?
• Could my study fill a gap? Lead to greater understanding?
• Has a great deal of research already been conducted in this topic area?
• Has this study been done before? If so, is there room for improvement?
• Is the timing right for this question to be answered? Is it a hot topic, or is it becoming obsolete?
• Will my study have a significant impact on the field?
In order to demonstrate that your problem is researchable, the statement of research problem should perform the following functions:

1. The context of research;
2. The focus of research;
3. The significance of research;
4. The framework for results and conclusions.
Quantitative research questions usually include:

1. Descriptive research questions;
2. Relational research questions;
3. Difference research questions.
The quantitative research problems are formulated through a deductive logic, that is starting with a general construct or theory, then identifying some operational variables to quantify the general construct or theory, and finally deciding on which variables to be observed:

1. Review of the construct;
2. Identification of variables;
3. Operational definitions of variables.
Research Hypothesis

For quantitative research, the framework of results and conclusions is presented in the format of hypothesis. In order to make a hypothesis useful in a research, research hypothesis has to meet the following criteria:

A hypothesis should state the expected pattern, relationship or difference between two or more variables;

1. A hypothesis should be testable;
2. A hypothesis should offer a tentative explanation based on theories or previous research;
3. A hypothesis should be concise and lucid.
Research problems are questions that indicate gaps in the scope other certainty of our knowledge.

They point either to problematic phenomena, observed events that are puzzling in terms of our currently accepted ideas, or to problematic theories, current ideas that are challenged by new hypotheses.
The problems of everyday life are difficulties to be avoided, if possible. Research problems are eagerly sought after. The difference is that research problems represent opportunities as well as trouble spots. Because scientific knowledge is provisional, all empirical findings and theories are in principle problematic and are, therefore, subject to further investigation.
Many scientists hold that research problems should be formulated by:

a. Carefully analysing as much of the relevant research literature as possible.

b. Formally stating the problem and the major hypotheses that the literature suggests, and only then collecting the data.

c. Their intention is to give research a clear and firm justification and to encourage hypothesis testing.
Review the evidence of support and challenges recorded on chart paper.

From these, identify three key issues affecting alignment that need to be addressed.

Recorder will write each issue on a sentence strip to post on the wall.
Step 1
State the Problem
Answer
Does / Does Not
Who What When Where How
Re-State the Problem

Step 2
Desired Future State
Answer
Does / Does Not
Who What When Where How
Re-State the Desired Future State

Step 3
Re-State the Problem combining the Current State and the Desired State
- Focused on one Problem.
- One or two Sentences.
- Does not suggest a solution.

Final Problem Statement
Example of the Flow of Ideas in the Problem Statement

**Flow of Ideas**

1. **Topic**
   - **Subject area**
     - Concern or issue
     - A problem
     - Something that needs a solution

2. **Research Problem**
   - **Ethical issues in colleges**
     - Ethical violations among football recruiters

3. **Justification for Research Problem**
   - **Gap in the literature**
     - Evidence from the literature
     - Evidence from practical experience

4. **Deficiencies in the Evidence**
   - **Description identifying and characterizing violations**
     - In this body of evidence what is missing or what do we need to know more about?

5. **Relating the Discussion to Audiences**
   - **Assessing violations**
     - How will addressing what we need to know help researchers, educators, policymakers, and other individuals?
   - **Helps recruiters develop better ethical standards**
   - **Helps athletes understand ethical issues**

**An Example**
It is well known that aggressive environments are the major factor affecting the durability of concrete (Zuquan et al., 2007). The early failure of concrete may be caused by external factors or by a variety of internal causes.
Research on the durability problem is still in progress. Nevertheless, various parameters, i.e., cement type, cement compositions, mineral admixtures, etc., have been thoroughly investigated in the past (Skalny et al., 2003). However, several parameters, such as chloride and sulfate concentrations, temperature, wetting and drying cycles, heating and cooling cycles, etc. require further investigation (Santhanam et al., 2001 and Sahmaran et al., 2007).
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