



Research and science: Qualitative methods

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INTRODUCTION TO RESEARCH AND SCIENTIFIC METHODS

Outline

- Definitions
- Problem formulation?
- Aim and goal
- **operational definition**
- **Research design**
- **Information sources**
- **Source criticism**

Science and research – definitions

- With science we mean some activity which generate new knowledge and systemize this in such a way that we can go behind the surface of reality.
- Science is characterized by its critical stance against dogmas, statements/claims and established truths
- Science is also characterized by that it is conducted by institutions.

Science and research – definitions

- What differs research from other knowledge building activities is that research follows certain rules.
- Karl Popper defines research as: “investigation of whether empirical observations deviates from formulated ideas theories”
- Scientific activities is characterized by if one is prepared to challenge ones thought and ideas, i.e. our conceptions about the reality (theories) must be in a verifiable form.

Science and research – definitions

- **Positivism** is the philosophy of science that information derived from logical and mathematical treatments and reports of sensory experience is the exclusive source of all authoritative knowledge, and that there is valid knowledge (truth) only in this derived knowledge.
- This positivism is generally equated with "quantitative research" and thus carries no explicit theoretical or philosophical commitments.
- If we formulate theories or hypothesis which we cant imagine how to disprove by confrontation with the empiri, then our theories are non scientific (falsification K. Popper)

Science and research – definitions

- **quantitative research** refers to the systematic empirical investigation of phenomena via statistical, mathematical or numerical data or computational techniques.
- The objective of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena.
- The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships.

Science and research – definitions

- **Intersubjective verifiability** is the capacity of a concept to be readily and accurately communicated between different individuals ("intersubjectively"), and to be **reproduced** under varying circumstances for the purposes of verification. It is a core principle of empirical, scientific investigation
- The laws of nature is (said to) not dependent on the researchers opinion, background, personal wishes, social context etc.
- The situation is different when one wants conduct meaningful interpretations of human actions

Science and research – definitions

- **Hermeneutics** (theory of text interpretation) reject the classical scientific research approach for “social science”.
- One state that there are no static laws for human behavior and the society.
- Human being have the ability to suspend and change the eternal and by that create their own future.

Science and research – definitions

- Clear difference between “science” and “social science” are:
 - There are no clear difference between the observer and observed
 - The human society is more than the sum of its citizens, which makes it harder to catch what is the object
 - The inconstant society

Problem formulation

- A “problem” is a tricky thing, something that require attention or a question.
- Research require that a question is asked in a certain manner (following the research rules) a so called problem formulation.
- Trivial or everyday questions is not considered as a **problem formulation**. This difference is caused by precision and the reason why the question is asked and the effort necessary to answer it.
- Problem formulation is the core of every research activity.
- The problem formulation have a deep impact on the overall research activity and the entire research processes

Problem formulation

- A problem formulation is often a precise questions which hare asked with a specific goal and in such an manner that it can be answered with scientific methods
- It often answer questions like: what, who were, how, when and why
- Have a deep impact on the overall research activity and the entire research processes

Problem formulation

- **Deductive reasoning**, also **deductive logic** or **logical deduction** or, informally, "**top-down**" **logic**, is the process of reasoning from one or more hypothesis to reach a logically certain conclusion.
- In **inductive reasoning**, the conclusion is reached by generalizing or extrapolating from initial information. As a result, induction can be used even in an open domain, one where there is epistemic uncertainty.

Problem formulation

- **Aleatoric uncertainty**, aka statistical uncertainty, which is representative of unknowns that differ each time we run the same experiment.
- **Epistemic uncertainty**, aka systematic uncertainty, which is due to things we could in principle know but don't in practice. This may be because we have not measured a quantity sufficiently accurately, or because our model neglects certain effects, or because particular data are deliberately hidden.

Aim/goal with your problem formulation

- To describe (support)
- To explain (causal reasoning)
- To understand (understanding of society)
- To predict
- To provide decision basis
- To change (action research)
- To develop new perspective (a new view of reality)
- To develop utopias (a community or society possessing highly desirable or near perfect qualities)

operational definition of problem formulation

- An **operational definition** is a result of the process of operationalization and is used to define something (e.g. a variable, term, or object) in terms of a process (or set of validation tests) needed to determine its existence, duration, and quantity, i.e. going from theory to empiri.
- **operationalization** is a process of defining the measurement of a phenomenon that is not directly measurable, though its existence is indicated by other phenomena.
- Since the degree of operationalization can vary itself, it can result in a more or less operational definition.
- The procedures included in definitions should be repeatable by anyone or at least by peers.

operational definition of problem formulation

- An example of operational definition of the term *weight* of an object, operationalized to a degree, would be the following: "weight is the numbers that appear when that object is placed on a weighing scale".
- According to it, the weight can be any of the numbers shown on the scale after, including the very moment the object is put on it.
- Clearly, the inclusion of the moment when one can start reading the numbers on the scale would make it more fully an operational definition. Nonetheless, it is still in contrast to those purely theoretical definitions.

Research design

Time sequence studies – investigate how phenomena's varies or correlate over long periods

Cross-sectional study - is a type of observational study that involves the analysis of data collected from a population, or a representative subset, *at one specific point in time*

A **longitudinal survey** is a correlational research study that involves repeated observations of the same variables over long periods of time — often many decades.

Research design

Experimental study - a study in which all of the factors are under the direct control of the investigator

A **case study** (or **case report**) is a descriptive, exploratory or explanatory analysis of a person, group or event. An explanatory case study is used to explore causation in order to find underlying principles

Comparative research is a research methodology in the social sciences that aims to make comparisons across different countries or cultures.

Research design

Futures studies (colloquially called "futures" by many of the field's practitioners) seeks to understand what is likely to continue and what could plausibly change. Part of the discipline thus seeks a systematic and pattern-based understanding of past and present, and to determine the likelihood of future events and trends.

Research design

Evaluation studies is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards.

- It can assist an organization, program, project or any other intervention or initiative to assess any aim, realisable concept/proposal, or any alternative, to help in decision-making; or to ascertain the degree of achievement or value in regard to the aim and objectives and results of any such action that has been completed.
- The primary purpose of evaluation, in addition to gaining insight into prior or existing initiatives, is to enable reflection and assist in the identification of future change

Information sources

- An **information source** is a source of information for somebody, i.e. anything that might inform a person about something or provide knowledge about it.
- Different types of questions require different sources of information.
- Information sources may be observations, people, speeches, documents, pictures, organizations, websites, etc.

Information sources

- **Primary sources** are original materials that have not been altered or distorted in any way. Information for which the writer has no personal knowledge is not primary.
- A **secondary source** is a document or recording that relates or discusses information originally presented elsewhere. A secondary source contrasts with a primary source, which is an original source of the information being discussed; a primary source can be a person with direct knowledge of a situation, or a document created by such a person.

Information sources

- A **tertiary source** is an index and/or textual consolidation of primary and secondary sources.†
- Some examples of tertiary sources are almanacs, guide books, survey articles, timelines, and user guides.
- Depending on the topic of research, a scholar may use a bibliography, dictionary, or encyclopedia as either a tertiary or a secondary source.

Information source criticism

- **Source criticism** (or information evaluation) is the process of evaluating an information source, i.e. a document, a person, a speech, a fingerprint, a photo, an observation or anything used in order to obtain knowledge.
- In relation to a given purpose, a given information source may be more or less valid, reliable or relevant.
- Broadly, "source criticism" is the interdisciplinary study of how information sources are evaluated for given tasks (cf. next sections).

Information source criticism

The following questions are often good ones to ask about any source:

- How was the source located?
- What type of source is it?
- Who is the author and what are the qualifications of the author in regard to the topic that is discussed?
- When was the information published?
- In which country was it published?
- What is the reputation of the publisher?
- Does the source show a particular cultural or political bias?

Information source criticism

For literary sources we might add complementing criteria:

- Does the source contain a bibliography?
- Has the material been reviewed by a group of peers, or has it been edited?
- How does the article/book compare with similar articles/books?