ISBN: 978-81-19149-41-4

4. Methodology in a Research Paper: Definition and Example

Dr. Makarand Upadhyaya

Associate Professor-Marketing,
Department of Management & Marketing,
University of Bahrain,
College of Business Administration,
Bahrain.

Abstract:

The methods section of a research paper provides the information by which a study's validity is judged. Therefore, it requires a clear and precise description of how an experiment was done, and the rationale for why specific experimental procedures were chosen. The methods section should describe what was done to answer the research question, describe how it was done, justify the experimental design, and explain how the results were analyzed. Scientific writing is direct and orderly.

An effective research methodology is grounded in your overall approach – whether qualitative or quantitative – and adequately describes the methods you used. In this paper we will Methodology in a Research Paper: Definition and Example.

Keywords:

Methodology, Research Paper, Definition, Example, Qualitative, Quantitative, Results, Discussion, Conclusion, Thesis, Dissertation, Research Proposal, Data Analysis Process.

4.1 Introduction:

The methodology in a research paper, thesis paper or dissertation is the section in which you describe the actions you took to investigate and research a problem and your rationale for the specific processes and techniques you use within your research to identify, collect and analyze information that helps you understand the problem.

In a scientific paper, the methodology always comes after the introduction and before the results, discussion and conclusion. The same basic structure also applies to a thesis, dissertation, or research proposal. [1]

Depending on the length and type of document, you might also include a literature review or theoretical framework before the methodology. First, we will define and differentiate quantitative and qualitative research.

Then, for each of these types of research, we will look at the kinds of information that a methodology should provide. This handout has annotated examples of both quantitative and qualitative methodologies.

Methodology or Materials and Methods covers explanations of research designs. Basically, techniques for gathering information and other aspects related to experiments must be described in a research paper. For instance, students and scholars document all specialized materials and general procedures. In this case, individuals may use some or all of the methods in further studies or judge the scientific merit of the work. Moreover, scientists should explain how they are going to conduct their experiments. [2]

A. Quantitative and Qualitative Research:

There are two main approaches to methodology; quantitative and qualitative. Quantitative research methodology relies on concrete facts and data-driven research, and qualitative research methodology relies on non-data-driven research, such as surveys and polls, to identify patterns and trends.

Quantitative research involves collecting numerical data and conducting mathematical analyses to observe trends, make predictions, run experiments, and test hypotheses.

Qualitative research involves collecting non-numerical data and identifying patterns in language, theme, and structure, among other features, to understand human experiences. Instruments for qualitative research include questionnaires, interviews, and observations. [3]

B. Purpose of Research Methodology:

The primary purpose of research methodology is to provide a clear outline of how you should conduct your research. This helps you in the following ways.

- Systematically explore the research goal.
- Ensure the accuracy of data collection and analysis.
- Minimize errors and bias.
- Enable replication of the study in the future to validate the findings.
- Draw meaningful and insightful conclusions to make informed decisions. [4]

4.2 Type of Research:

The first part of a methodology section usually describes the type of research you perform and how you develop your research methods. This section also discusses the question or problem you investigate through your research and the type of data you need to perform evaluations and research assessments. Additionally, the methodology often includes the criteria your experimental studies need to meet to produce valid and reliable evidence.

A. Data collection process:

The methodology also includes an explanation of your data collection process. For instance, if you perform experimental tests on samples, conduct surveys or interviews or use existing data to form new studies, this section of your methodology details what you do and how you do it. As the name suggests, data collection methods simply refer to the way in which you go about collecting the data for your study. Some of the most common data collection methods include:

- Interviews (which can be unstructured, semi-structured or structured)
- Focus groups and group interviews
- Surveys (online or physical surveys)
- Observations (watching and recording activities)
- Biophysical measurements (e.g., blood pressure, heart rate, etc.)

- Documents and records (e.g., financial reports, court records, etc.) [5]

B. Data analysis process:

Your data analysis approaches are also important in your methodology. Your data analysis describes the methods you use to organize, categorize and study the information you collect through your research processes. Data analysis methods refer to the methods and techniques that you'll use to make sense of your data. These can be grouped according to whether the research is qualitative (words-based) or quantitative (numbers-based).

Popular data analysis methods in qualitative research include:

- Qualitative content analysis
- Thematic analysis
- Discourse analysis
- Narrative analysis
- Interpretative phenomenological analysis (IPA)
- Visual analysis (of photographs, videos, art, etc.)

C. Resources, materials and tools:

The tools, materials and other resources you need for your research and analysis are also important elements to describe in your methodology. Software programs, mathematical and statistical formulas and other tools that help you perform your research are essential in documenting your methodology.

D. Rationale behind the research:

Since your methodology aims to show readers why your research is valid and relevant, the last part of this section of your research paper needs to focus on your rationale. Details like why your studies are relevant, what industries your studies relate to and how other researchers can replicate your results are essential components of this part of your methodology. [6]

4.3 Research Methodology Section in Research Paper:

Let's see what research methodology steps to take to complete a well-thought-out paragraph:

- Begin by indicating your methodological approach, whether quantitative, qualitative, or mixed methods.
- Explain how your chosen methodology is objective and relevant to your research problem.
- Describe the instruments and tools you use to collect data (surveys, questionnaires for interviews, archival research, or observation), and provide background information if necessary.
- Discuss how you plan to analyze the data using chosen methods (statistical analysis or exploring theoretical perspectives).
- Deliver background information on any particular methods your readers may not be familiar with.
- Describe your sampling process and explain why you chose this method. If you decide to do interviews, explain how you'll conduct them and select participants.
- Acknowledge and address any potential limitations in your research, including practical issues that may impact data collecting, and explain why you apply your methodology despite the potential risks.

Methodology in research refers to the scientific framework adopted in the research process. Data for research in methodology is collected through surveys, interviews, group discussions, and tracking online trends. [7]

A. Inductive vs. Deductive research: Inductive reasoning in methodology is a blank-page approach, where researchers create hypotheses from observed patterns. Deductive reasoning in methodology is concerned with creating hypotheses around existing theories.

A mixed approach combines inductive and deductive research in different parts of the study where either is best suited.

Table 4.1: Examples of each approach [8]:

Type of Research	Example
Inductive	**Observation** – Your Uber ride took longer than the subway.
	Pattern – Your Uber ride has taken longer than the subway for 2 weeks
	Theory – Uber rides take longer than the subway
Deductive	**Theory** – Uber rides take longer than the subway
	Hypothesis – If you took the subway, you would get there faster than an Uber
	Collect data on time taken by both means in one route
Mixed	Begin with the **observation** and work with the **theory** in mind

4.4 Types of Methodologies:

Three research methodology types are distinguished by their focus on numbers, words, or both. Let's clarify their differences and features.

A. Quantitative Research Methodology: T

his approach aims to measure and test numerical data. It is used to confirm something. The method employs various techniques, such as tests, surveys, and existing databases. For instance, the quantitative methodology may be appropriate if you need to test several hypotheses.

B. Qualitative Research Methodology:

It involves the collection and analysis of textual data and words. This approach is commonly used for exploratory research, where the study objective is to understand a phenomenon. It involves various techniques like interviews, observations, and focus groups.

Exploratory research may be particularly useful in Sociology or Psychology, which aims to understand human actions.

C. Mixed Methodology:

This approach combines quantitative and qualitative methodologies. The quantitative method provides definitive facts and figures, while the qualitative approach adds a particular human aspect to the research. Researchers can obtain exact and exploratory data using a mixed-method approach, leading to incredibly interesting outcomes. [9]

4.5 Methodology vs. Methods:

The confusion between "methodology" and "methods" in research is a common occurrence, especially with the terms sometimes being used interchangeably. Methods and methodology in the context of research refer to two related but different things: method is the technique used in gathering evidence; methodology, on the other hand, "is the underlying theory and analysis of how research does or should proceed". Methodology as "a set of principles and ideas that inform the design of a research study." Meanwhile, methods are "practical procedures used to generate and analyze data. To summarize these definitions, methods cover the technical procedures or steps taken to do the research, and methodology provides the underlying reasons why certain methods are used in the process. [10]

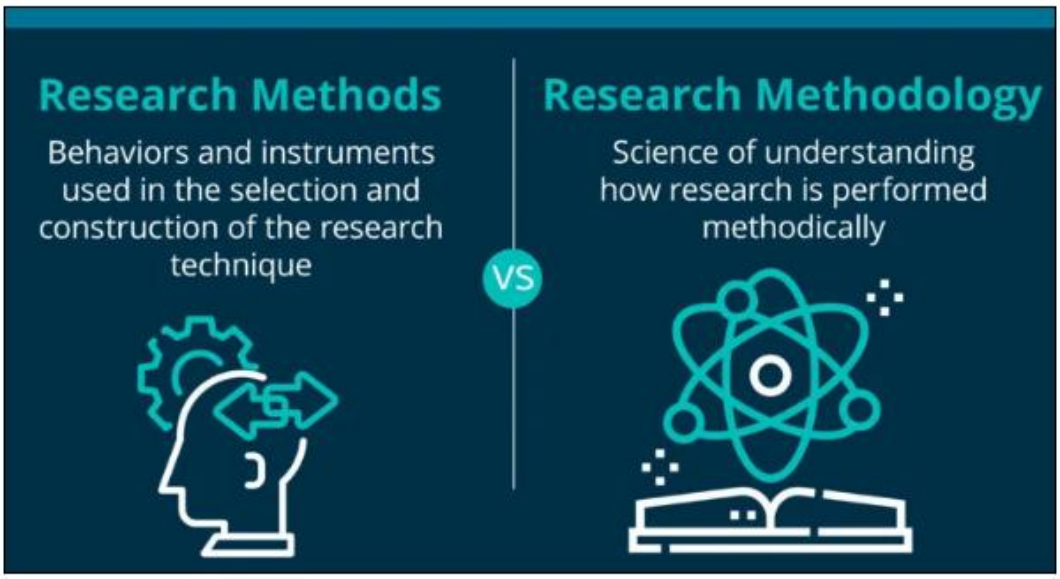

Figure 4.2: Methodology vs. Methods (Source: Surbhi,2016)

4.6 Writing Research Paper Methodology:

The research methodology is an important section of any research paper or thesis, as it describes the methods and procedures that will be used to conduct the research. It should include details about the research design, data collection methods, data analysis techniques, and any ethical considerations.

The methodology should be written in a clear and concise manner, and it should be based on established research practices and standards. It is important to provide enough detail so that the reader can understand how the research was conducted and evaluate the validity of the results.

Th e concept of the research onion model to help researchers develop a methodology and construct research design techniques within the field of future studies. The characteristic of research onion model is illustrated by its six main layers, which serve as a step-by-step guide for researchers on how to write a research methodology. [11]

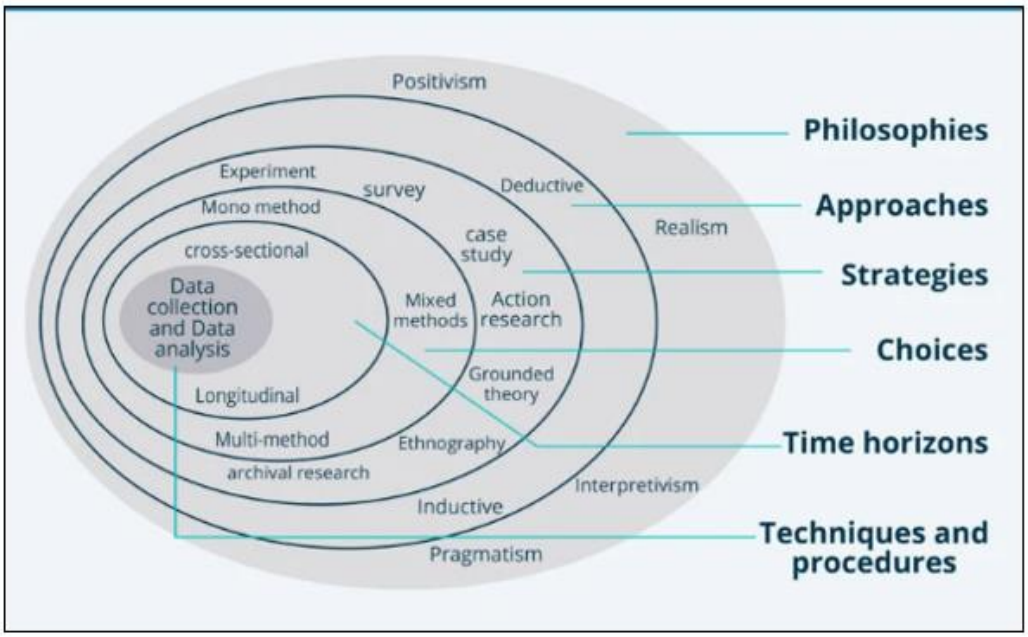

Figure 4.3: The Research Onion Model (Source: Saunders, et.al)

Research Design

A. **Introduce Your Methods:** Introduce the methodological approach used in investigating your research problem. In one of the previous sections, your methodological approach can either be quantitative, qualitative, or mixed methods. Look for a methodology in research example that you can use as a reference.
B. **Establish Methodological Connection:** Explain the relevance of your methodological approach to the overall research design. Keep in mind that the connection between your methods and your research problem should be clear. This means that your methodology of research must be appropriate to achieve your paper's objective—to address the research problem you presented. To wit, if you need help to write your research problem, refer to our article on what is a research question.
C. **Introduce Your Instruments:** Indicate the research instruments you are going to use in collecting your data and explain how you are going to use them. These tools and instruments can be your surveys, questionnaires for interviews, observation, etc. If your methods include archival research or analyzing existing data, provide background information for documents, including who the original researcher is, as well as how the data were originally created and gathered. Keep in mind that aside from your methodology in research paper, the identification of the research instrument is equally significant.
D. **Discuss Your Analysis:** Explain how you are going to analyze the results of your data gathering process. Depending on your methodology, research for ways on how you can best execute your study either by using statistical analysis or exploring theoretical perspectives to support your explanation of observed behaviors.
E. **Provide Background Information:** When using methods that your readers may be unfamiliar with, make sure to provide background information about these methods. It would also help if you can provide your research methodology meaning so you can present a clear and comprehensive research context.
F. **Discuss Sampling Process:** Sampling procedures are vital components of your methodology. Explain the reason behind your sampling procedure. For example, if you are using statistics in your research, indicate why you chose this method as well as your sampling procedure. If you are going to do interviews, describe how are you going to choose the participants and how the interviews will be conducted.

G. Address Research Limitations: Make sure to address possible limitations you may encounter in your research, such as practical limitations that may affect your data gathering process. [12]

4.7 Example of a Methodology in a Research Paper:

Methodology research paper example is a useful tool for writing research because it demonstrates the principles of structuring the research methodology section. Taking into account the irreversible place of the methodology part of the research paper, methodology research paper example must demonstrate how the researcher is going to prove the hypothesis or to decide the problem of the investigation. Thus, the review of the methodology research paper example should occupy the important place during the preparation for the research. In an abstract, you will need to explain your methodology. Some examples of explaining your methodology include the ways you collected and analyzed data (such as through surveys), the type of research you chose, and your rationale behind the methodology. Below are some examples of methodology. As you read through each one, think about what you would have to know about your research plan to describe it similarly.

Example: A mixed-method approach was used to understand how local high school students perceive dress codes. Firstly, a Likert scale survey was disbursed to over 200 students from the Albany school district. The Likert scale is generally considered to be the gold standard of ordinal data collection.

Survey takers were asked to rank their agreement with statements about dress codes on a scale from “strongly disagree” to “strongly agree.” At the end of the survey, participants were asked if they would be interested in discussing their opinions further in an interview. Open-ended interviews were conducted with 50 respondents to contextualize and gain a more in-depth understanding of the survey rankings.

Note how this example makes it clear a) what type of survey was used, b) why the author chose that survey, c) what they hoped to learn from the survey, and d) how they supplemented it with interview questions.)

Research Design

The following example of a methodology in a research paper provides insight into the structure and content to consider when writing your own:

This research article discusses the psychological and emotional impact of a mental health support program for employees. The program provided prolonged and tailored help to job seekers via a job support agency that kept contact with applicants beyond initial job placement to give different forms of assistance. I chose a 50% random selection of respondents who participated in the employment agency's support program between April and October and met the research criteria I created based on prior and comparable studies.

My colleagues and I randomly allocated the 350 resultant patients to the treatment or control groups, which included life skills development and career training in an in-house workshop setting. My colleagues and I assessed the 350 participants upon admission and again after they reached the 90-day employment requirement.

The psychological functioning and self-esteem assessments we conducted revealed considerable evidence of the impact of treatment on both measures, including results that contradicted our original premise.

We discovered that, rather than demonstrating better functioning and higher self-esteem, participants in the therapy group exhibited poorer cognitive and emotional functioning and self-esteem. These findings prompted my study team and me to conclude that people who consider themselves unfulfilled in their jobs often endure a substantial decline in performance as a consequence of increased workplace stress and lower emotional well-being, irrespective of their mental health status.

Sampling:

Analysts in statistical surveying broadly utilize diverse inspecting techniques, so they don’t have to investigate the whole population to gather significant experiences. It is additionally a period advantageous and a practical approach and subsequently shapes the premise of any exploration plan. Inspecting strategies can be utilized in an exploration overview programming for the ideal deduction.

The population for this study will be from different levels of employees at ADNOC Company and Ministry of Education. These two Companies provide two various services, one is oil production and the other is an educational service in UAE. The study will require a sample of 200employees from both Companies in order to participate in this study.

Random sampling will obtain use in selecting 100employees from each of these companies. This study will rely on these two companies so as to ensure that employees from different diversities and with diverse experiences obtain selection for reliability of collected data.

4.8 Problems to Avoid:

A. **Irrelevant Detail:** The methodology section of your paper should be thorough but to the point. Do not provide any background information that does not directly help the reader understand why a particular method was chosen, how the data was gathered or obtained, and how the data was analyzed in relation to the research problem [note: analyzed, not interpreted! Save how you interpreted the findings for the discussion section]. With this in mind, the page length of your methods section will generally be less than any other section of your paper except the conclusion.
B. **Unnecessary Explanation of Basic Procedures:** Remember that you are not writing a how-to guide about a particular method. You should make the assumption that readers possess a basic understanding of how to investigate the research problem on their own and, therefore, you do not have to go into great detail about specific methodological procedures. The focus should be on how you applied a method, not on the mechanics of doing a method. An exception to this rule is if you select an unconventional methodological approach; if this is the case, be sure to explain why this approach was chosen and how it enhances the overall process of discovery.
C. **Problem Blindness:** It is almost a given that you will encounter problems when collecting or generating your data, or, gaps will exist in existing data or archival materials. Do not ignore these problems or pretend they did not occur. Often, documenting how you overcame obstacles can form an interesting part of the methodology. It demonstrates to the reader that you can provide a cogent rationale for the decisions you made to minimize the impact of any problems that arose.

D. Literature Review: Just as the literature review section of your paper provides an overview of sources you have examined while researching a particular topic, the methodology section should cite any sources that informed your choice and application of a particular method [i.e., the choice of a survey should include any citations to the works you used to help construct the survey].

E. It's More than Sources of Information: A description of a research study's method should not be confused with a description of the sources of information. Such a list of sources is useful in and of itself, especially if it is accompanied by an explanation about the selection and use of the sources. The description of the project's methodology complements a list of sources in that it sets forth the organization and interpretation of information emanating from those sources. [13]

4.9 Conclusion:

Research methodology serves as a blueprint to guide researchers in conducting a structured study and gathering accurate and reliable data.

It ensures that you draw meaningful conclusions and make data-driven decisions. the types of Research Methodology, a researcher can systematically design the study to get reliable results.

Also, Research Methodology should justify that the selected type of research methodology is the fittest for the best outcome. A sound research methodology results in scientifically sound effects, but flawed research methodology fails to do so.

4.9 References:

1. Allan, AJ, Randy, LJ, 2005, Writing the Winning Thesis or Dissertation. A Step-by-Step Guide, Corwin Press, California.
2. Brown RB, 2006, Doing Your Dissertation in Business and Management: The Reality of Research and Writing, Sage Publications.
3. Cohen, L, Manion, L, Morrison, K & Morrison, RB, 2007, Research Methods in Education, Routledge.
4. O'Leary Z. 2004 "The essential guide to doing research". Sage.

5. Ullstrom S. Sachs MA, Hansson J, Ovretveit J, & Brommels M. (2014). Suffering in Silence: a qualitative study of second victims of adverse events. British Medical Journal, Quality & Safety Issue. 23:325-331.
6. Walli man, N. S. & Walli man N. (2011) “Research methods: the basics” Taylor and Francis.
7. Cohen, L. (1980). Research methods in education. London, England: Groom Helm Ltd.
8. Creswell, J.W. (1994). Research design: Qualitative and quantitative approaches. London, England: Sage Publications.
9. Patton, M. Q. (1990). Qualitative evaluation and research methods. Los Angeles, California: University of California.
10. Bond, T. (2003), Validity and Assessment: A Rasch Measurement Perspective, Methodology de las Ciancia’s del Comport mento, 5(2): 179–194.
11. Brink, H.I.L. (1993), Validity and Reliability in Qualitative Research, Curations, 16(2): 35-38.
12. Kallet, Richard H. "How to Write the Methods Section of a Research Paper." Respiratory Care 49 (October 2004): 1229-1232.
13. Azevedo, L.F. et al. "How to Write a Scientific Paper: Writing the Methods Section." Revista Portuguesa de Pneumological 17 (2011): 232-238;