



QUANTITATIVE ROADMAP: EXPLORING METHODOLOGY THROUGH THE LENS LITERATURE REVIEW

(PETA JALAN KUANTITATIF: EKSPLORASI METODOLOGI MELALUI LENS KAJIAN PUSTAKA)

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DOI: <https://doi.org/10.62567/micjo.v2i3.927>

Article info:

Submitted: 18/06/25

Accepted: 20/07/25

Published: 30/07/25

Abstract

Quantitative research is a crucial foundation in the scientific landscape to understand phenomena objectively and measurably. Although essential, there is often a gap between methodological idealism and research practice, especially among novice researchers, which is indicated by the use of quantitative methods that are not optimal in student theses due to lack of mastery of methodology and statistics, marked by inconsistencies in variable logic, lack of theoretical basis, data bias, sampling technique errors, to inaccuracy in testing the validity of instruments and statistical analysis. Through a systematic and comprehensive literature review, this article aims to present a complete picture of the “roadmap” of quantitative research, including the essence, principles, key stages (starting from problem formulation, sample determination, instrument development, data collection, to analysis and interpretation of results), and its various types, rooted in the positivist paradigm that emphasizes objectivity and hypothesis testing. Although quantitative research offers significant advantages such as time efficiency and generalizability, challenges such as difficulty in data collection and lack of in-depth analysis also need to be overcome, so improving methodological and statistical training is crucial to producing valid, accountable scientific work that contributes significantly to the development of science.

Keywords: Quantitative Research, Research Methodology, Literature Review

Abstrak

Penelitian kuantitatif merupakan fondasi krusial dalam lanskap ilmiah untuk memahami fenomena secara objektif dan terukur. Meskipun esensial, seringkali terdapat kesenjangan antara idealisme metodologis dan praktik penelitian, terutama di kalangan peneliti pemula, yang terindikasi dari penggunaan metode kuantitatif yang belum optimal pada skripsi mahasiswa akibat kurangnya penguasaan metodologi dan statistik, ditandai oleh ketidaksesuaian logika variabel, ketiadaan dasar teori, bias data, kesalahan teknik sampling, hingga ketidaktepatan dalam pengujian validitas instrumen dan analisis statistik. Melalui kajian pustaka yang sistematis dan komprehensif, artikel ini bertujuan menyajikan gambaran utuh “peta jalan” penelitian kuantitatif, meliputi esensi, prinsip, tahapan kunci (mulai dari perumusan masalah, penentuan sampel, pengembangan instrumen, pengumpulan data,



hingga analisis dan interpretasi hasil), serta berbagai jenisnya, dengan berakar pada paradigma positivisme yang menekankan objektivitas dan pengujian hipotesis. Meskipun penelitian kuantitatif menawarkan keunggulan signifikan seperti efisiensi waktu dan kemampuan generalisasi, tantangan seperti kesulitan pengumpulan data dan kurangnya analisis mendalam juga perlu diatasi, sehingga peningkatan pelatihan metodologi dan statistik sangat krusial untuk menghasilkan karya ilmiah yang valid, dapat dipertanggungjawabkan, dan berkontribusi signifikan pada pengembangan ilmu pengetahuan.

Kata Kunci: Penelitian Kuantitatif, Metodologi Penelitian, Kajian Pustaka

1. INTRODUCTION

In the ever-evolving landscape of scientific research, quantitative methods have played a central role as a foundation for understanding phenomena objectively and measurably. Their ability to test hypotheses, analyze relationships between variables, and generate accurate generalizations makes them a crucial choice across disciplines, including education and the social sciences. However, behind the urgency and excellence of this methodology, conceptual and empirical abstractions often arise that require further clarification. How exactly is quantitative research designed and conducted to produce valid and reliable findings? What are the types, and how can we choose the most appropriate approach to answer complex research questions?

The reality in the field shows that not all researchers, especially beginners, have a comprehensive and consistent understanding in the application of quantitative methods. There are indications of inconsistencies in the logic of variables, the absence of a strong theoretical basis, and inaccuracy in the selection of statistical analysis techniques (Hadi, 2015). In fact, studies show that the use of quantitative methods in student theses is still relatively low and often suboptimal due to a lack of mastery of methodology and statistics (Hadi, 2015). This phenomenon underlines the gap between methodological idealism and existing research practices, creating a situation that demands deeper conceptual and empirical explanations.

Through the lens of a systematic and comprehensive literature review, this introduction aims to present a complete picture of the “roadmap” of quantitative research. By referring to a review of various scientific literature, we will try to present the essence, principles, key stages, and various types of quantitative research. We will also highlight crucial aspects such as problem formulation, population and sample determination, instrument development, data collection techniques, and statistical analysis, all of which are vital elements in ensuring the objectivity and accuracy of research. Thus, through this literature exploration, it is hoped that a clear and structured understanding can be developed, providing practical guidance for researchers to navigate the complexities of quantitative research and produce quality and accountable scientific work.

2. RESEARCH METHODS

This research method uses a literature review, which is a research approach by collecting and analyzing data from various relevant literature sources such as books, journals, scientific articles, and official documents. This process begins with a search for various library sources, both physical and digital, to obtain the information needed. The collected data is then analyzed in depth and comprehensively, identifying similarities, differences, and supporting research ideas. This approach was chosen to gain a comprehensive understanding of the topic being studied.

3. RESULTS AND DISCUSSION

1. Basic Concepts and Types of Quantitative Research

Quantitative research is a fundamental approach in the world of scientific research that is rooted in the positivist paradigm (Muhajirin et al., 2024). This philosophy views that phenomena, especially in a social context, can be classified, measured, and have clear cause-and-effect relationships (Berlianti et al., 2024). Therefore That is, quantitative research is oriented towards the collection and analysis of numerical data with the main aim of testing hypotheses and relationships between variables statistically. This approach is also known by



various names such as traditional, positivistic, scientific, or even empirical methods. discovery and confirmatory, all of which emphasize its systematic and structured nature (Muhajirin et al., 2024).

Key characteristics of quantitative research include the use of representative populations or samples, the application of deductive processes in formulating and testing hypotheses, and the emphasis on objectivity achieved through instruments that have been tested for validity and reliability (Berlianti et al., 2024). In addition, this method allows researchers to guess and predict, obtain accurate analysis results, and simplify complex problems in mathematical models.

Quantitative research has a wide spectrum of types, each with its own specific purpose, based on research conducted by Samsu (in Syahrizal & Jailani, 2023) that the descriptive method, for example, aims to describe the object or subject of research as it is. Meanwhile, the correlational method focuses on describing the relationship between two or more variables without researcher manipulation. There is also a comparative method used to determine the differences or similarities between variables or groups. To test cause-and-effect relationships, quantitative research uses experimental methods, including true experiments and quasi experiments, which involve controlling external variables and even manipulating independent variables. Survey methods are also often used to collect information from samples through questionnaires or interviews. By understanding these various types, researchers can choose the approach that best suits their research questions.

2. Methodological Strategies and Crucial Stages in Quantitative Research

Designing quantitative research requires careful planning and follows a linear and structured procedure. This roadmap begins with conceptualizing the problem and formulating a clear hypothesis, which serves as a temporary answer to the research problem. Choosing the right research design, such as an experiment or survey, is a crucial first step. One of the most important methodological aspects is determining the population and sample. According to Berlianti et al., (2024) a population is defined as all subjects with similar characteristics, while a sample is a representative part of the population to be studied. Researchers need to understand how to determine the number of samples needed and choose the appropriate sampling technique so that the data collected can be generalized.

Research instruments also play a vital role as data collection tools. The quality of the instrument must be guaranteed through validity and reliability testing, unless using a standard instrument that has been tested. For example, the development of instruments using the Likert scale need to be presented in detail, including how changes in the number of statement items can occur after the validity test. As for data collection techniques, researchers carry out activities to obtain relevant data. Various techniques commonly used include distributing questionnaires, exams or tests, documentation studies, and structured interviews. More sophisticated methods such as Experience Sampling Methods (ESM) ordinary study also promises to dig up more information and minimize memory bias (Saefuddin, et al., 2023). In any data collection process, it is important to identify the variables being measured and explain the data sources, including limitations in the data collection method.

3. Quantitative Data Analysis and Interpretation of Results

After the data is collected, the next step that is no less important is data analysis. Statistical analysis plays a crucial role in quantitative research, it functions to process data, test hypotheses, and draw accurate conclusions. Understanding the requirements for using statistical formulas is very important, both for descriptive and inferential statistics.

In data analysis, there are various approaches. Descriptive analysis is used to summarize data and provide an overview of the characteristics of the variables studied. Meanwhile, inferential analysis aims to generalize the results from the sample to the population



and test the established hypothesis. To understand the relationship between variables, correlation analysis can be used, and for more complex interactions between more than two variables, multivariate analysis is the choice (Rosyidah & Masykuroh, 2024). Researchers must also consider when to use parametric or nonparametric statistics, as well as ensure that the classical assumptions for parametric statistics are met (Wahidmurni, 2017). Examples of concrete implementations, such as data analysis using Structural Equation Modeling (SEM), can also be displayed to provide a clearer picture (Wahidwarni, 2017).

Interpretation of results is a vital final stage in data analysis. Researchers must consider the internal and external validity of the findings, statistical and practical significance, and their consistency with the theoretical context and previous research (Rosyidah & Masykuroh, 2024). This process ensures that the conclusions drawn are not only based on numbers but also have relevant and accountable meaning.

4. Challenges, Advantages, and Practical Implications of Quantitative Research

Quantitative research offers a number of significant advantages, making it a very relevant choice in the development of science. These advantages include time and cost efficiency, ease of tabulation and field data analysis with the help of statistical software, as well as its ability to facilitate comparisons between groups of analysis units. This method also allows researchers to estimate and predict, obtain accurate analysis results, measure interactions between variables, and maintain research objectivity (Berlianti et al., 2024). With its specific characteristics and producing numbers, quantitative research tends to be more time efficient and focuses on results (products) (Patonah et al., 2023).

However, the implementation of quantitative research is not without challenges. Some of these include difficulties in collecting data from respondents who are difficult to reach and potential data quality problems (Rosyidah & Masykuroh, 2024). In addition, this method sometimes does not consider the meaning behind social phenomena in depth and the data collection environment may feel unnatural (Ali et al., 2022). There are also shortcomings, where the results of data analysis may be limited to the same population and sample, and are less effective for data analysis with small samples (Patonah et al., 2023).

Empirical studies show inconsistencies and inaccuracies in the use of quantitative methods in student theses. These inconsistencies often arise in the logic of variables, the absence of a theoretical basis, data bias, errors in sampling techniques, and the failure to test the validity and reliability of the instrument (Hadi & Rahmini, 2015). Inaccuracies in statistical analysis, such as inconsistencies in the measurement scale and analysis techniques chosen, are also often found. This pattern of less than optimal use of quantitative methods is influenced by students' lack of mastery of methodology and statistics. Therefore, increasing training in methodology and statistics is essential so that students are able to choose the appropriate technique and interpret data correctly (Hadi & Rahmini 2015). In conclusion, choosing the right type of research is crucial so that the results obtained are valid and accountable, and can contribute significantly to the development of science.

4. CONCLUSION

Quantitative methodology plays a vital role in the scientific research landscape, providing an objective and measurable framework for exploring various phenomena. However, the reality on the ground shows significant challenges, especially among novice researchers, who often have not fully mastered the implementation of this method. Identified problems include inaccuracy in the formulation of variable logic, the absence of a strong theoretical basis, errors in sampling techniques, to inaccuracy in testing the validity of instruments and inappropriate statistical analysis. This indicates a gap between methodological idealism and actual research practice.

Through a comprehensive literature review, this article has outlined a "roadmap" of quantitative research, starting from its philosophical foundation rooted in positivism, various types of research



designs (descriptive, correlational, comparative, experimental, and survey), to crucial stages such as problem formulation, population and sample determination, development of valid and reliable instruments, data collection techniques, and statistical analysis and interpretation of results. Although quantitative research offers advantages such as efficiency, objectivity, and generalizability, it also faces limitations, including potential difficulties in data collection and lack of in-depth analysis of the nuances of social phenomena.

Therefore, it is crucial to improve the understanding and mastery of methodology and statistics among researchers, especially students, to ensure that they are able to choose the right techniques and interpret data accurately. Choosing the right research approach is key to producing findings that are not only valid and accountable, but also able to make substantive contributions to the advancement of science.

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