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Classification and application approaches in scientific research methodologies: an analytical perspective

ABSTRACT

This study provided an analytical perspective on classification and application approaches in scientific research methodologies. The objective was to clarify the conceptual foundations of research methods, emphasizing their definitions, classifications, and practical applications across different scientific disciplines. A qualitative, analytical–descriptive methodology was adopted, based on a comprehensive review of theoretical and empirical literature related to research methods. The results showed that the diversity of research problems, human subjects, and phenomena requires the use of multiple methodological approaches, including historical, descriptive, experimental, case study, and content analysis methods. It was also found that relying on a single method is often insufficient, making methodological integration necessary to enhance the validity and reliability of research findings. Furthermore, the study highlighted that flexibility, objectivity, and methodological rigor are essential elements in scientific inquiry. In conclusion, the appropriate selection and application of research methods significantly influence the quality, validity, and usefulness of research outcomes, reinforcing the importance of methodological pluralism in contemporary scientific research.

Keywords: Scientific Research Methodology, Research Approaches, Historical Method, Descriptive Method, Experimental Method.

Enfoques de clasificación y aplicación en metodologías de investigación científica: una perspectiva analítica

RESUMEN

El presente estudio ofreció una perspectiva analítica sobre los enfoques de clasificación y aplicación en las metodologías de investigación científica. El objetivo consistió en esclarecer los fundamentos conceptuales de los métodos de investigación, destacando sus definiciones, clasificaciones y aplicaciones prácticas en diversas disciplinas científicas. Se empleó una metodología cualitativa de tipo analítico-descriptivo, basada en la revisión de literatura teórica y empírica relacionada con los métodos de investigación. Los resultados evidenciaron que la diversidad de problemas de investigación, sujetos y fenómenos exige la utilización de múltiples enfoques metodológicos, tales como el método histórico, descriptivo, experimental, estudio de caso y análisis de contenido. Asimismo, se determinó que el uso de un único método resulta, en muchos casos, insuficiente, lo que hace necesaria la integración metodológica para garantizar la validez y confiabilidad de los resultados. Se concluye que la selección y aplicación adecuada de los métodos influye directamente en la calidad y utilidad de los resultados, resaltando la importancia del pluralismo metodológico.

Palabras clave: Metodología de la Investigación Científica, Enfoques de Investigación, Método Histórico, Método Descriptivo, Método Experimental.

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Abordagens de classificação e aplicação em metodologias de investigação científica: uma perspectiva analítica

RESUMO

Este estudo apresentou uma perspectiva analítica sobre as abordagens de classificação e aplicação nas metodologias de pesquisa científica. O objetivo foi esclarecer os fundamentos conceituais dos métodos de pesquisa, destacando suas definições, classificações e aplicações práticas em diferentes disciplinas científicas. Foi adotada uma metodologia qualitativa de caráter analítico-descritivo, baseada na revisão de literatura teórica e empírica relacionada aos métodos de pesquisa. Os resultados demonstraram que a diversidade de problemas, sujeitos e fenômenos exige a utilização de múltiplas abordagens metodológicas, incluindo métodos histórico, descritivo, experimental, estudo de caso e análise de conteúdo. Também foi identificado que o uso de um único método é frequentemente insuficiente, tornando necessária a integração metodológica para garantir a validade e confiabilidade dos resultados. Conclui-se que a seleção e aplicação adequada dos métodos influenciam diretamente a qualidade e utilidade dos resultados da pesquisa, destacando a importância do pluralismo metodológico na pesquisa científica contemporânea.

Palavras-chave: Metodologia da Pesquisa Científica, Abordagens de Pesquisa, Método Histórico, Método Descritivo, Método Experimental.

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INTRODUCTION

Many concepts and variables have emerged with the transformations taking place today, especially in scientific research circles in general and social research in particular. With the emergence of globalization and its wide-ranging effects across multiple fields—particularly in scientific research and research methods—new horizons have opened for systematic inquiry, including areas that were previously considered difficult or even inaccessible. This is especially relevant for the study of social phenomena, which are often characterized by complexity and variability. In this context, scientific methodology has evolved significantly, adapting to new epistemological and practical challenges in knowledge production (Davidavičienė, 2018;

Thomas & Thomas, 2021).

The first axis: a conceptual introduction to the method

The scientific method of research and investigation is considered one of the most important characteristics that define the scientific nature of research and thinking. In contrast to earlier reliance on intuition and unsystematic approaches, modern scientific inquiry emphasizes objectivity, organization, and systematic investigation, both quantitatively and qualitatively. This evolution has led to the consolidation of methodology as a structured set of techniques guiding the research process and ensuring rigor in the generation of knowledge (Tacconi, 2017; Lebedev, 2016). Accordingly, methodology can be understood as a system of organized procedures that direct scientific inquiry toward reliable and valid results.

1. Definition of method

Science is organized knowledge that originates from reality and seeks to interpret or understand it. The scientific researcher, as a human being endowed with reasoning and analytical capacities, follows a specific path or program to uncover truth. This process is governed by a set of rules that structure thinking and guide it toward logical conclusions. Reality, from this perspective, is not random but organized within frameworks that allow the researcher to construct theoretical principles (Fayrouz, 2007, p. 57; Dźwigoł & Dźwigoł, 2018). Thus, the scientific method is understood as a structured process through which knowledge is systematically generated.

The method may also be defined as the path leading to the desired objective through the study of obstacles and difficulties. Contemporary scientific thought considers it a structured process governed by general rules that direct reasoning toward the discovery of truth. Similarly, it is viewed as a means for uncovering knowledge, facts, and laws, where the validity of research findings depends largely on the rigor of the methodological approach adopted. Abdul Rahman Badawi defined it as a structured path guided by rules that organize mental processes to achieve knowledge (Ibrahim, 2000, p. 68). Maurice Angers (2004, p. 98) also described it as an organized set of operations aimed at achieving a specific goal.

From these definitions, there is a general consensus that the method represents a sequence of organized steps followed by the researcher to discover facts. It can be described as a systematic organization of ideas aimed either at uncovering unknown truths or demonstrating known ones. In applied research contexts, the method also determines the validity of findings and the reliability of interpretations, as highlighted in methodological applications such as case studies and information systems research (Lee, 1989).

The second axis: classification of methods

In this section, the classification of research methods is addressed. Rather than being a matter of controversy, classification represents an effort to identify the most appropriate methodological approach depending on the nature of the research problem. Classifications vary according to the criteria used, and the same method may appear in different classifications due to its multidimensional nature (Szostak, 2004; Bailey, 1994). This diversity reflects the complexity of scientific inquiry and the need for flexible methodological frameworks.

The researcher determines the appropriate method based on the type and nature of the research, whether theoretical or applied, as well as its objectives and underlying problem. In many cases, the choice of method is influenced not only by the researcher's preference but also by external conditions and contextual factors (Al-Husseini, 2011). This perspective aligns with contemporary approaches that emphasize adaptability and methodological pluralism in scientific research (Järvinen, 1997).

Therefore, research methods differ according to topics, and each method has specific functions and characteristics that researchers must master. For example, historical research

requires the use of the historical method, while the study of individual behaviors may involve case study approaches. In some situations, researchers may need to combine multiple methods to address complex research problems effectively. This integrative perspective is supported by modern classification systems, which highlight the importance of combining descriptive, analytical, and interpretative approaches (Liao & Wen, 2007; Waltman & Van Eck, 2012).

Furthermore, rigid separation between methods does not serve scientific research, as it may limit objectivity and analytical depth. Instead, flexibility in methodological application is necessary, allowing researchers to integrate different approaches according to the demands of the research problem. This view is consistent with broader perspectives on classification, which emphasize the dynamic and evolving nature of scientific knowledge and its organizational systems (Sokal, 1974; Hjørland & Albrechtsen, 1999; Brennan, 1987).

Accordingly, we mention these approaches as follows:

As previously indicated, the diversity and increasing complexity of scientific research topics have led to a corresponding diversification of methods and approaches used in research. This plurality reflects the need to adapt methodological tools to the nature of the phenomena under study and to the epistemological perspectives guiding the research process (Della Porta & Keating, 2013; Ordoñez-Pacheco, 2025). In general terms, three major research approaches can be identified according to the style of thinking involved (Zerouati, 2012, pp. 167–168).

1. **The deductive approach** is based on logical reasoning, where the mind establishes relationships between premises and conclusions, moving from general principles to specific cases. This approach relies on rational analysis and theoretical generalizations, allowing researchers to derive conclusions from established assumptions (Amaiquema Márquez et al., 2019).
2. **The inductive approach** follows the opposite direction, beginning with the observation of specific cases and progressing toward generalizations. It is grounded in empirical verification through observation, experimentation, and control of variables, enabling the formulation of general laws that explain the studied phenomenon (Vizcaíno Zúñiga et al., 2023).
3. **The normative (standard) approach** is based on the use of predefined criteria or frameworks, often derived from doctrinal or theoretical foundations, to interpret and explain phenomena. This approach is particularly useful in disciplines where evaluation depends on established norms or models (Haro Sarango et al., 2024).

Rachid Zerouati also proposed a classification of research methods according to their procedural orientation. Within this framework, several methods can be identified, among which the historical method stands out as one of the most relevant in the field of social sciences.

The historical method is widely used in the humanities and sociology due to its capacity to analyze and interpret past events in order to understand present realities. It involves a systematic effort to examine historical phenomena, identify their underlying causes, and assess their impact on contemporary social issues (Obaidat et al., 1998, p. 36). Through this retrospective perspective, researchers are able to gather data of a cognitive nature that contributes to explaining current societal dynamics.

This method focuses on studying the past as a means of understanding the present and, to some extent, anticipating future developments. It examines historical events by tracing their origins, transformations, and the factors that shaped them over time. However, unlike experimental methods, it does not rely on direct observation or controlled experimentation, but rather on primary and secondary sources such as documents, archives, and testimonies (Alyan & Ghoneim, 2000, p. 37). This reliance on historical records requires rigorous processes of source criticism and validation to ensure the reliability of the analysis.

The primary objective of the historical method is to reconstruct past events through the systematic collection, evaluation, and interpretation of documentary evidence. In this sense, the researcher must engage in a critical examination of sources before proceeding to analysis. Maurice Angers (2004, p. 105) defines it concisely as a method concerned with the study and interpretation of past events through structured research and document analysis.

In addition to its traditional use, the historical method is often complemented by other methodological approaches, such as descriptive and analytical methods, to provide a more comprehensive understanding of social phenomena. This integrative perspective aligns with contemporary methodological trends, which emphasize flexibility and the combination of multiple approaches to address complex research problems (Padrón, 2007; De la Peña Consuegra & Velázquez Ávila, 2018).

Furthermore, modern research increasingly recognizes the importance of methodological diversity, including approaches such as case studies and classification-based analyses, which contribute to a more nuanced understanding of social and organizational realities (Villarreal Larrinaga & Landeta Rodríguez, 2010; Milligan & Hirtle, 2003). In this regard, methodological rigor depends not only on the correct selection of a specific method but also on the researcher's ability to integrate different approaches in a coherent and systematic manner (Espinoza Freire, 2015; Espinoza Freire & Toscano Ruíz, 2015; Espinoza Freire, 2020).

Dr. Muhammad Azimi briefly lists a group of goals, which are:

The historical or retrospective method, what some call it, aims to recover the facts of events from the past by describing, analyzing and interpreting them on strict scientific foundations. Accordingly, its objectives can be determined in:

Next points: (Great, 2025)

Verify the veracity of past events

Revealing the causes of the accident, through its connection to previous or contemporary accidents

Revealing the meaning of the incident

To embody a clear understanding of the historical method, we decided to provide these practical examples and we will follow the same method with the rest of the methods.

Practical examples of the historical method:

- Educational method in the Ottoman era.

- Industry in Andalusia.

- The educational response of the Association of Familiar Scholars to colonial policy.

- Jews in the Islamic Maghreb.

2- Descriptive approach:

And he from More Curricula Use in Maidan Science Social Lama It is characterized by Beh from Privacy Fits And nature Al Zahaby Social And from This Al-Matla Saaed This El Style to Tafsir And analysis.

It is known as Gomaa Descriptions And information Minute An Al Zahaby Study studied Kama There is Actually In fact Wala He is satisfied Curriculum Descriptive At Kathir from Scientists Ali Description Only Bal Exceeds to Specify Relationship And its amount And try Discovery Reasons Latina Khalaf Al Zahaby And he It is considered Previously To use Curriculum Experimental and expressive About her Kevia And quantitatively And he explains Its characteristics And its connection Maa Phenomena Other (Dawoudi, M., & Qani'a, p. 124).

This I mean Aan Curriculum Descriptive He cares Study present Phenomena And events On the contrary Curriculum Historical Althani He studies El Past.

It can also be defined as a method of analysis and interpretation in an organized scientific manner in order to reach specific purposes for a social situation or research problem, analyze it, determine the scope and scope of the survey, examine all documents related to the problem, interpret the results, and finally reach conclusions and use them for local or national purposes.

Dr. Ahmed Azimi also defines it as a method of analysis that focuses on sufficient and accurate information about a specific phenomenon or topic, or a specific period or periods of time, in order to obtain scientific results, and then interpret them in an objective manner, in line with the actual data of the phenomenon.

It can also be defined as an accurate and detailed description of a specific phenomenon or subject in a qualitative or quantitative digital form. The qualitative expression describes the phenomenon and explains its characteristics, while the quantitative expression gives us a numerical description that explains the amount or size of this phenomenon and the degree of its connection with various other phenomena (Great, 2025)Through this presentation of a set of definitions about description and the descriptive method, a common characteristic emerges on which this method depends, which is analysis, interpretation, and revealing the relationship between variables through the process of description. It is no wonder to say that these characteristics are among the basics and pillars of scientific research, which shows the importance of this method and the areas of its use, even in the natural sciences.

The descriptive approach is also used to study the current conditions of phenomena in terms of their characteristics, forms, relationships, and factors affecting them. This means that the descriptive approach is concerned with studying the present phenomena and events, unlike the historical approach that studies the past Noting that the descriptive approach often includes predictions for the future of the phenomena and events it studies, its main goal is to understand the present to guide the future by describing the present by providing sufficient data to clarify and understand it, then making comparisons, determining the relationships between factors, and developing conclusions through what the data indicate (Descriptive, 2025)

And it is related The descriptive approach is often used in social science and humanities studies In its many political and economic fields, which it has used since its inception and appearance, but this does not mean that its use and application is limited to these sciences only, but rather it is sometimes used in natural science studies to describe various natural phenomena.

In general, the descriptive approach aims to: Either to monitor a specific phenomenon or topic with the aim of understanding Its content, or it may be its goal Basic: Evaluating a specific situation for purposes Operation (Obaidat et al., 1998, p. 46). Through a set of points, the descriptive approach aims to:

- Collecting real information about a phenomenon that actually exists in a particular society.

- Identify existing problems or clarify some phenomena.

- Comparing and evaluating some phenomena.

- Identifying what individuals do in a problem, benefiting from their opinions and experiences, and developing future visions and plans and taking appropriate measures in problems of a similar nature.

- Finding the relationship between different phenomena (Obaidat et al., 1998, p. 46)

Examples of the descriptive approach:

- Parents' cultural awareness and its relationship to domestic violence

- Violence against working women.

- Social values and their relationship to work problems.

3- Experimental approach:

If we talk about the debate between the natural sciences and the humanities, the dividing line between them is the experimental method, given the peculiarities of this method that were a stone blocking the way for its application in the humanities and social sciences. Thanks to it, the occultities that characterized these specializations and the relativity of the results reached through research were eliminated It began with psychology and then expanded to other disciplines in sociology and the humanities using steps and tools used by experimentation.

On this basis, the experimental method is considered the closest research method to solving problems in a scientific way and experimentation, whether done at work, in the classroom, or in another field... It is an attempt to control all the basic variables and factors except for one variable, which the researcher adapts or changes with the aim of determining and measuring its effect on the process (Obaidat et al., 1998, p. 117) Several definitions of the experimental method have been presented, perhaps the most prominent of which was presented by Maurice Ingres in brief, as a method of studying a research topic by subjecting it to experimentation and making it a study based on causality (Angers, 2004, p. 102)

It is also expressed as the method in which the features of the scientific method of thinking are clearly evident because it includes an organization that collects evidence in a way that allows choosing hypotheses and controlling various factors that can affect the phenomenon under study and reaching relationships between causes and effects. The experiment is generally characterized by ideas of re-conducting it by other people while reaching the same results if the circumstances are unified.

Or it is a method that depends on change Intentional And the seized one For conditions Al-Mukhadda For the incident or Al Zahaby Althani Takun Subject To study. And note Ma' Produces An This Change from Effects in This reality The phenomenon. or Note It is done Undertaken Circumstances Tuned To prove Assumptions And knowledge Relationship Causality. And he means it By circumstances Seized Input Variable Experimental to reality And adjust Impact Variables Other.

And by Other Can Definition Ali Grammar Next:

Use Experience in Proof Assumptions, or Proof Assumptions An road Experimentation (Al-Farmawi, 2025)

Through these steps, the experimental method aims to achieve a set of goals that prove its scientific character, which depends on accuracy and objectivity.

It seeks to establish the relationship between cause and effect between phenomena or variables. To establish the relationship between cause and effect, we conduct an experiment during which one or more variables are treated by changing their content several times «which Be between the independent variable and the dependent variable (Angers, 2004, p. 102)

Under the guise of social sciences, the experimental method may face some difficulties, like other methods, due to the complexity of the social phenomenon on the one hand, and the difficulty of placing it within a quantitative and qualitative framework on the other hand, as is the case, for example, with historical studies and studies that include customs, traditions, and even values in a specific geographical area. However, this does not negate There are some advantages to the experimental method compared to other methods.

Mezaat Curriculum Experimental: We will mention some of them briefly.

- By This Curriculum Can Boots Knowing Ather The reason Ali The result No An road Conclusion Kama Huwa By searching Causal Comparative.

- Huwa Curriculum Al Thany Althani It is done In it adjust Variables Foreign Ministry Zia Impact Ali Variable Al-Tabaa.

- Aan Multiple Designs This Curriculum Make it flexible Can Adapt it to Hadd Kabir to Cases Kathira And diverse (Al-Farmawi, 2025).

Practical examples of the experimental method:

The impact of kindergarten experience on the child's achievement in an educational subject.

The effect of structural capital on workers' achievement motivation.

4- Case study approach:

There is a semi-controversy regarding the classification of this approach between those who see it as a method on which the descriptive approach is based and those who make it a stand-alone approach that has its own tools and peculiarities like other approaches, and given the similarity of the topics studied between them, we can ask a question in this regard about the fundamental difference that separates the case study approach from Descriptive approach, and to define this endeavor we must first understand what a case study means.

It is known as Study Inqama For a model Wahid Qad Takun Fardaa or Foundation or Together or More For sample he means Menna Access to Generalizations to Ma' Huwa Wider An road Study Model Mukhtar (Dawoudi, M., & Qani'a, p. 124). And he Style Used A lot In studies that focus on delving into one or more models.

It is also defined as a method through which data can be collected and studied so that a comprehensive picture can be drawn of a specific unit in its various relationships.

This method is based on collecting a lot of comprehensive data and information about one individual case or a limited number of cases with the aim of reaching a deeper understanding of the phenomenon under study and similar phenomena, as it collects data about the current status of the case under study as well as its past and relationships in order to gain a deeper and better understanding of the society it represents (Olayan, 2000, p. 46). Through this definition of method, the most important feature of this approach is that it enables the researcher to penetrate into the depths of the phenomena or situations that he studies instead of stopping at what is superficial and does not express what is real.

According to this framework, case studies are considered an effective method To study social and human phenomena in an exploratory analytical manner, which shows us a set of characteristics that characterize this method.

One of the advantages of the case study is that it focuses on the overall unit to identify its characteristics and features, which is the method of organizing data specific to a selected unit, such as the life history of an individual, a group, or a specific social unit.

There are those who summarized the characteristics of the condition as follows:

- It is a way to obtain comprehensive information about the cases studied.
- It is a method of qualitative analysis of phenomena and conditions.
- It is a method that deals with the overall situation, the various factors affecting it, and the processes it witnesses.
- It is a tracking method, meaning that it relies heavily on the element of time, and therefore it is concerned with historical study.
- It is a dynamic approach that is not limited to examining the current situation.
- It is an approach that seeks to integrate knowledge because it relies on more than one tool to obtain information.

Practical examples of the case study approach:

- Education programs and globalization issues Türkiye as a model.

Intellectual capital and its role in performance: a case study of a group of institutions.

5- Content analysis approach:

The material that the researcher deals with according to this method differs from other approaches, as the researcher here deals with the content expressed in documents and records, and to determine the true meaning of content analysis as an organized method, we find these definitions.

This method is based on an organized and accurate description of the content of written or audio texts by defining the subject and objective of the study and defining and identifying the study population for which cases will be selected to study and analyze its content (Olayan, 2000, p. 48.)

In terms of use, content analysis is based on studying the current conditions in society at all levels and the relationships that link society with other systems through communication and its nature.

This type of analysis relies on reports, media, and official records, from which trends are extracted to extract the true directions that express a specific reality. Research can also take facts into account in person, without interference from the individual, so that the analysis is honest and reflects the feelings and true viewpoints of individuals (Bouhoush & Al-Dhanibat, 2007, p. 150)

Practical examples of the content analysis approach:

- Religious and social values in primary school textbooks.

- A study of the content of the political speeches of an opposition or loyalist party.

- An analytical study of the values included in intermediate and secondary level books.

These are roughly the approaches commonly used in the social sciences In general, although there are other methods that we have not discussed in this research paper, we will refer to them only based on what Professor Rachid Zerouati (2012) has listed. Among these methods are the following:

Curriculum Comparative: And in it Follow Researcher Way Comparison Been Awja Difference And faces Al-Ettifaq.

Minhaj Survey: Depends Ali Gomaa Information And data from All Members community Study.

Curriculum Anthropologist: And in it Follow Researcher Techniques Analysis Cultures Peoples Primitive.

Curriculum Ethnology: And in it Uses Researcher Techniques Analysis Veins Humanity.

W Kahusla Lahata Categories YordMaurice Ingres in His schedule About Properties Curricula Model The three Classification organized And comprehensively According to Al-Maqasid Means And topics And he As follows:

Table 1.

Characteristics of the three model curricula

	Experimental method	Historical approach	Field research methodology
Maqasid	Causality of phenomena	Rebuilding the past	Multiple according to the research objective
Wasila	Experiments	- External criticism - And internal documents	Various techniques for collecting data
Topics	Measurable phenomena	Phenomena From the past	Population phenomena

CONCLUSION

In conclusion, this brief presentation of the methods and approaches used in the social sciences and the most important criteria and foundations according to which they are classified, shows first the importance of using the scientific method no matter how the method and steps change. This is on the one hand, and on the other hand, it remains necessary for the researcher to be objective in using the methodological methods of research because objectivity is the advantage of someone who investigates reality with the greatest possible honesty.

LIMITATIONS OF THE STUDY

This study was limited by its reliance on secondary sources and theoretical analysis, which may restrict the depth of empirical validation. Additionally, the broad scope of methodological approaches addressed may have constrained the detailed examination of each method within specific disciplinary contexts.

FUTURE RESEARCH

Future studies should incorporate empirical research designs to validate the practical application of the discussed methodologies. Further research may also explore the integration of emerging digital and interdisciplinary methods in scientific research processes.

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AUTHOR CONTRIBUTIONS

- **Attia Walid:** Conceptualization, theoretical framework, writing – original draft.
- **Achouri Djamal-Eddine:** Literature review, methodology design, data analysis.
- **Zitouni Aiboud & Mohamed Lamine Haichour:** Review, editing, and final validation of the manuscript.

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