

**SCIENTIFIC PARADIGMS IN RESEARCH: CONCEPTUAL FOUNDATIONS,
EPISTEMOLOGICAL CONTRAST AND APPLICATION CRITERIA**

**Jorge Alfonso Gutierrez Silva¹, Hebert Alberto Delgado Mier², Ralfis
Rafael cassiani Santana³, Carlos Martinez Acuña⁴, David Moreno
Ruiz⁵**

¹Universidad Popular del Cesar, Valledupar, Colombia, Email: jalfonsogutierrez@unicesar.edu.co

² Universidad Popular del Cesar, Valledupar, Colombia, Email: hebertdelgado@unicesar.edu.co

³ Universidad Popular del Cesar, Valledupar, Colombia, Email: ralfiscassiani@unicesar.edu.co

⁴ Universidad Popular del Cesar, Valledupar, Colombia, Email: carlosmartinez@unicesar.edu.co

⁵ Universidad Popular del Cesar, Valledupar, Colombia, Email: davidmoreno@unicesar.edu.co

Abstract

This study examines scientific paradigms as epistemological frameworks that guide knowledge production in research, based on Kuhn's (1970) notion of paradigm and its reinterpretation in the social sciences by contemporary authors. Three widely recognized paradigms positivist, interpretive, and socio-critical are analyzed, describing their ontological and epistemological foundations, as well as their methodological consequences and purposes. The text characterizes their structural similarities and differences regarding the conception of reality, the role of the research subject, the meaning of knowledge, and the modes of access to it. Furthermore, their uses and areas of application are discussed in relation to the type of research problem and the study's objectives. The conclusion is that no paradigm is universal or superior; rather, its relevance lies in the epistemological coherence between object, method, and purpose, and in the capacity to respond critically to the nature of the phenomenon under investigation.

Keywords: research paradigms, positivism, interpretive, socio-critical

1. Introduction

The notion of a scientific paradigm is a central axis for understanding the mechanisms by which knowledge is legitimized, organized, and reproduced within academic communities. Following Kuhn's thesis, a paradigm is not simply a research technique, but rather operates as a disciplinary matrix that defines the problems that can be formulated, the recognized criteria of truth, and the acceptable methods for examining reality [1]. From this perspective, every investigative act necessarily implies an ontological, epistemological, and methodological stance that conditions the definition of reality and the determination of what is knowable.

In the field of social sciences, the paradigmatic debate has acquired particular characteristics, insofar as the object of study involves subjects, meanings, culture, power relations, and historical processes. Authors such as Ricoy [2], Pérez [3], Alvarado and García [4], and Gómez [5] have systematized three widely recognized paradigmatic orientations: positivism, interpretivism, and the socio-critical approach. These differ in their conception of reality, the role attributed to the researcher, the criteria for the validity of evidence, and the purpose of the knowledge they produce.

Thus, the positivist paradigm focuses on explaining regularities through measurement and control; the interpretive paradigm prioritizes the understanding of meanings and symbolic constructions; and the socio-critical paradigm is oriented toward the transformation of social conditions through emancipatory praxis. Although they diverge in their philosophical assumptions, all three paradigms share the function of providing coherence to the research process and justifying the validity and rigor of the results within their own frames of reference.

This chapter examines the conceptual foundations, similarities, differences, and uses of scientific paradigms, emphasizing that their selection is not a mere formality, but rather an epistemological decision that determines the very meaning of the research. The methodology employed falls within the interpretive paradigm, with a qualitative approach and a hermeneutic method, based on a systematic review aimed at constructing the state of the art and the theoretical framework that supports the critical interpretation of the philosophical and epistemic positions underlying knowledge production in contemporary science [6]-[7]-[8].

2. Methodology

The development of this work is situated within the interpretive paradigm, as it assumes that scientific knowledge is not a neutral product but a situated construction that emerges from the critical interpretation of discourses and epistemological traditions. From this perspective, the study adopts a qualitative approach, prioritizing the comprehensive and contextualized analysis of theoretical and documentary sources on research paradigms in the social sciences.

The method employed is hermeneutics, understood not only as a technique for textual interpretation but also as a reflective procedure that allows for understanding the historical, philosophical, and epistemic meaning of the concepts analyzed. This method makes it possible to reconstruct intentions, semantic cores, and underlying epistemological assumptions in the discourses of classical and contemporary authors on positivism, interpretivism, and the socio-critical paradigm [8].

In accordance with the above, the study is operationalized through a state-of-the-art design, oriented toward the systematization, comparison, and problematization of existing conceptual developments on scientific paradigms. This design allows for the organization

and comparison of relevant academic production, the identification of convergences and tensions between approaches, and the derivation of methodological application criteria according to the type of research problem.

The documentary corpus is comprised of foundational works (Kuhn, Comte, Husserl, Habermas) and contemporary contributions (Ricoy, Alvarado, García, Martínez, and others), selected based on criteria of thematic relevance, theoretical rigor, and academic currency. The interpretation of these sources aims to produce a comparative analysis that accounts for the conceptual foundations, epistemological contrast, and application criteria of scientific paradigms in research, in accordance with the study's title.

3. Results and Discussion

3.1. Scientific Paradigm

A scientific paradigm refers to a system of principles, theories, procedures, and achievements accepted by a scientific community, which operates as a frame of reference for the generation of knowledge and the formulation of new research in a given field. The notion was initially proposed by Thomas S. Kuhn in “The Structure of Scientific Revolutions” (1962), in which the author argues that paradigms act as disciplinary matrices responsible for guiding reasoning, delimiting legitimate research problems, and defining valid methods for addressing them. Consequently, a paradigm determines not only the object of study, but also the way of investigating it and the purpose attributed to that knowledge [1].

In the field of social sciences and humanities, Ricoy [2], identifies three of the most widespread paradigms: the positivist, the interpretive, and the socio-critical. These orientations differ in their epistemological stance, the methods they legitimize, and the purpose they assign to knowledge. The positivist paradigm prioritizes objectivity, measurement, and the formulation of general laws; the interpretive paradigm focuses on understanding the meaning of human actions in specific contexts; and the socio-critical paradigm is oriented toward social transformation through reflective and emancipatory praxis. Consequently, these approaches diverge not only in their conception of knowledge but also in the implications they have for research practice.

Broadly speaking, a scientific paradigm constitutes a philosophical and epistemological framework that regulates how reality is interpreted, how knowledge is conceived, and how it is accessed through procedures consistent with its postulates [1]-[2]-[9]. As Ricoy [2], points out, the names assigned to paradigms have varied historically, reflecting both the evolution of epistemological currents and the differences in disciplinary application. Thus, the positivist paradigm has also been called quantitative, empirical-analytical, rationalist, or scientific-technological; the interpretive paradigm, qualitative, symbolic, phenomenological, or humanist; and the socio-critical, engaged, naturalist, or ecological paradigm [2].

3.2. Scientific Paradigms: Positivist, Interpretive, and Socio-Critical

3.2.1. Positivist Paradigm

The positivist paradigm is recognized as one of the most influential currents in the evolution of scientific thought, particularly in the natural sciences. This approach is based on the assumption that reality is objective, unique, and external to the observer, and that it can be known through systematic observation, controlled experimentation, and the use of empirical instruments. As Usher and Bryant [10], Ricoy [2], and Martínez [9] point out, positivism relies on an epistemology that prioritizes quantitative measurement, the replication of results, and the formulation of general laws that allow for the causal explanation of the phenomena studied.

Its historical development is situated between the 19th century and the first decades of the 20th century, preceding the strengthening of the experimental scientific model. Its foundations are associated with the classical positivism of Auguste Comte, who postulated a science devoid of value judgments and focused exclusively on observable facts. Authors such as John Stuart Mill, Émile Durkheim, and Karl Popper joined this line of thought, and their contributions consolidated the paradigm as a methodological framework for addressing empirical reality.

This position conceives of knowledge as objective and independent of the researcher's subjectivity; therefore, it must be measurable, quantifiable, and statistically analyzable. Under this logic, valid knowledge emerges from the rigorous application of the scientific method, the control of variables, and value neutrality, minimizing subjective biases and guaranteeing precision, reliability, and verifiability.

The positivist paradigm has been widely applied in studies that demand high control and experimental rigor, such as clinical research, educational evaluations, mass surveys, and statistical analyses of large populations. Although it has limitations for the study of phenomena full of meaning and interpretation, its influence persists in multiple academic and professional fields, especially when seeking to test hypotheses, establish causal relationships or produce generalizable predictions.

3.2.2. Interpretive Paradigm

The interpretive paradigm, also called the comprehensive or hermeneutic paradigm, focuses on unraveling the meanings that individuals attribute to their actions, discourses, and contexts. It starts from the premise that reality does not exist as an objective and external entity, but rather is socially constructed through symbolic interaction and lived experience. From this perspective, both the researcher and the participants are recognized as subjects who possess subjectivity, which plays a role in the construction of knowledge.

Methodologically, this approach prioritizes qualitative procedures such as in-depth interviews, participant observation, narrative analysis, and case studies. Its use is common in disciplines such as anthropology, interpretive sociology, qualitative psychology, and education fields where the emphasis is on interpreting experiences, cultural meanings, and social significance.

Regarding its intellectual roots, the interpretive paradigm draws from currents such as phenomenology, symbolic interactionism, ethnography, and cultural anthropology. Edmund Husserl's phenomenology is recognized as a foundational antecedent, as are the contributions of Dilthey, Schutz, Weber, Mead, Blumer, Berger, and Luckmann, who broadened the understanding of the social meaning of action.

According to Pérez [3], Ricoy [2], Kobylarek [11] y Martínez [9], this paradigm is characterized by core principles: (a) knowledge is generated from praxis and situated interpretation, not from imposed theories; (b) the production of knowledge is relative, contextual, and imbued with meaning, mediated by culture, history, and interaction; and (c) the research aim is to describe, understand, and interpret phenomena in their complexity through approaches sensitive to context and intersubjectivity.

In summary, the interpretive paradigm offers a comprehensive reading of social reality that gives centrality to subjectivity, lived experience and context as constitutive dimensions of the knowledge process[2]-[3]-[9]-[11]..

3.2.3. Socio-Critical Paradigm

The socio-critical paradigm constitutes a research orientation that is not limited to describing or explaining social reality, but rather directs knowledge toward its transformation from an emancipatory perspective. It is based on the tradition of critical theory, Marxism, liberation pedagogy, and participatory approaches, under the premise that knowledge is neither neutral nor separate from power relations, but rather is permeated by social structures, dominant ideologies, and specific historical conditions [2]-[12].

Unlike other paradigms, this approach recognizes the subjects being researched as reflective agents and protagonists of the research process. Therefore, it prioritizes methodologies such as participatory action research, collaborative research, and other dialogical approaches, where the researcher acts as a facilitator of dialogue, critical reflection, and transformative action. Among its key theoretical references are Horkheimer, Adorno, Habermas, Freire, Carr, and Kemmis [13]-[14].

According to Escudero [13], Ricoy [2], Alvarado and García [12], Asghar [15], and Martínez [9], this paradigm is characterized by:

- Self-reflective nature. It assumes that solutions to problems emerge from the affected community itself. Critical self-reflection allows for the recognition of structural conditions and the initiation of transformative processes of reinterpretation.
- Participatory nature. The relationship between researcher and participants is conceived as horizontal; the subjects participate in the formulation of problems, decisions, and alternatives, strengthening the legitimacy of the knowledge generated (Alvarado and García, 2008).
- Emancipatory nature. The aim is to promote empowerment through the critical appropriation of knowledge, which enhances the collective capacity to influence the environment [15].
- Consensual decision-making. Actions are defined through collective deliberation, building intervention strategies based on shared responsibility [2].
- Democratic and shared vision. Knowledge is constructed collectively under principles of inclusion, equity, and recognition of diversity (Alvarado and García, 2008).
- Predominance of practice. The value of the paradigm lies in its transformative impact in specific contexts, without aspiring to universalize theories [10]-[12].

In short, the socio-critical paradigm integrates knowledge, participation, and action with the explicit purpose of influencing the ethical and structural transformation of social realities.

3.3. Similarities and Differences Between Scientific Paradigms

3.3.1. Similarities

Research paradigms share certain structural features that allow them to be considered legitimate scientific frameworks. First, they are all based on a theoretical conception of the nature of knowledge, that is, on an explicit epistemological position. Second, each one guides the production of knowledge considered valid and reliable according to its own internal methodological criteria. Finally, their application requires coherence between the research aims, the methodological strategies employed, and the way in which the results obtained are interpreted..

3.3.2. Differences

The differences between paradigms are not instrumental, but structural, as they stem from ontological, epistemological, and methodological divergences that condition how reality is conceived and investigated.

- On the ontological level, the positivist paradigm maintains that reality is objective, external, and accessible through rigorous observation free from subjectivity. The interpretive approach, on the other hand, assumes that reality is socially constructed through meanings,

perceptions, and situated experiences. The socio-critical approach adds that this reality is mediated by social, economic, political, and historical structures that condition experience and, therefore, must be revealed and transformed.

- On an epistemological level, positivism conceives of the researcher as a neutral observer whose task is to discover empirical regularities and formulate general laws. Interpretivism recognizes that the researcher actively participates in the production of knowledge, which is constructed together with the subjects being researched from their own frameworks of meaning. The socio-critical paradigm goes further by positioning the researcher as an ethical-political agent committed to emancipation and the critique of structures of domination.
- On a methodological level, positivism uses quantitative methods such as experiments, surveys, and statistical analyses aimed at measuring variables and establishing causal relationships. The interpretive approach prioritizes qualitative methods interviews, participant observation, and discourse analysis to understand meanings from the actors' perspectives. The socio-critical approach employs dialogical and participatory methodologies action research, collaborative research, and participatory research—aimed not only at understanding but also at transforming social realities together with the communities.

3.4. Uses and Applications of Paradigms

The positivist paradigm is particularly relevant for research aimed at verifying hypotheses, quantifying variables, and identifying causal relationships between observable phenomena. This approach is frequently used in fields that demand metric precision and high experimental control, such as epidemiology, psychometrics, empirical economics, and certain areas of evaluative education. Its focus is on the objectivity of the process, the possibility of replication, and the use of rigorous statistical methods that allow for obtaining generalizable and empirically verifiable results.

The interpretive paradigm, on the other hand, is oriented toward a deep understanding of the meanings that individual or collective subjects attribute to their experiences, practices, and contexts. Its application is especially appropriate when research seeks to explore social realities from a situated, subjective, and dynamic perspective. It is frequently used in case studies, ethnographies, phenomenological research, discourse analysis, and other qualitative approaches that prioritize the interpretation of symbolic, cultural, and identity processes that shape social life.

Unlike the previous paradigms, the socio-critical paradigm stems from a transformative conception of knowledge. It does not limit itself to describing or understanding reality, but rather seeks to question, problematize, and modify it through collective action, critical reflection, and awareness-raising. This approach is especially relevant in research aimed at community empowerment, denouncing structural inequalities, and building emancipatory alternatives. Its application is common in popular education, social work, critical pedagogy,

and studies linked to academic activism, where the researcher assumes a participatory, ethical, and committed role in social transformation.

In short, comparative analysis allows us to conclude that there is no single, absolutely superior paradigm; each offers distinct and legitimate tools for addressing the complexity of knowledge from diverse perspectives. The paradigmatic selection must respond to the nature of the problem being investigated, the context in which it is situated, and the epistemological and ethical purposes of the researcher.

4. Conclusions:

The analysis conducted allows us to affirm that scientific paradigms constitute frameworks of rationality that delimit the ontological, epistemological, and methodological horizon of research. By defining what reality is, who can know it, and what procedures are legitimate for accessing it, paradigms operate as intellectual technologies that order scientific practice and sustain its justification before the academic community. Far from being mere nominal labels, they configure philosophical commitments that shape the questions that can be formulated, the data that can be collected, and the criteria by which the phenomenon under study is interpreted or transformed.

The contrast between the positivist, interpretivist, and socio-critical paradigms confirms that there is no single path to producing scientific knowledge. While positivism privileges objectivity, measurement, and replicability, interpretivism places meaning and experience at the core of understanding, and the socio-critical paradigm integrates knowledge and praxis with an emancipatory purpose. Such differences do not imply a hierarchy, but rather a diversity of rationalities necessary to confront the complexity of social and human phenomena.

It is concluded that the choice of a paradigm should not be based on disciplinary tradition or personal preferences, but rather on the congruence between the research problem, the nature of the object of study, the objectives pursued, and the type of knowledge required. Furthermore, in contemporary contexts of high social complexity, the heuristic value of paradigmatic dialogue is recognized, provided that the internal consistency of the adopted assumptions is preserved. In short, understanding, contrasting, and critically applying scientific paradigms is a prerequisite for producing rigorous, relevant, and responsible knowledge in the social sciences.

Referencias

- [1] Kuhn TS. *The structure of scientific revolutions*. 2nd ed. Chicago: University of Chicago Press; 1970
- [2] Ricoy Lorenzo C. Contribución sobre los paradigmas de investigación. *Educação*. 2006;31(1):11–22.

- [3] Pérez Serrano G. *Investigación cualitativa: Retos e interrogantes. II. Técnicas y análisis de datos*. Madrid: Editorial Muralla; 1994.
- [4] Alvarado L, García M. Características más relevantes del paradigma socio-crítico: su aplicación en investigaciones de educación ambiental y de enseñanza de las ciencias. UPEL; 2008. Disponible en: <https://dialnet.unirioja.es>
- [5] Gómez A. Paradigmas, enfoques y tipos de investigación. 2010. Disponible en: <https://issuu.com>
- [6] Martínez HE, Pumarejo HM, Montero MJ, Monter E. State of the art design: Reflections, meaning, objective, structure and example. *Russian Law Journal*. 2024;12(1). doi:10.52783/rlj.v12i1.3931
- [7] Salcedo J, Martínez H, Urriago J, Romero A. The theoretical framework in research: meaning, functions, structure and example for its design. *Russian Law Journal*. 2022;10:877–884. doi:10.52783/rlj.v10i4.4450
- [8] Martínez HE. *El proceso de investigación científica en la universidad*. Valledupar: Fundación Élite; 2010.
- [9] Martínez, H. E. (2025). Fundamentos filosóficos del conocimiento científico: gnoseología, epistemología, paradigmas y enfoques de investigación. En *Filosofía, essência e existência: questões fundamentais e reflexões filosóficas* (pp. 117–149). Atena Editora. <https://doi.org/10.22533/AT.ED.7501125240310>
- [10] Urher, R., & Bryant, L. (1992). *La educación de adultos como teoría, práctica e investigación*. Madrid: Morata.
- [11] Kobylarek, A. (2014). *Text analysis in the interpretative paradigm of research*.
- [12] Alvarado, L., & García, M. (2008). Características más relevantes del paradigma socio-crítico: su aplicación en investigaciones de educación ambiental y de enseñanza de las ciencias. UPEL, Instituto Pedagógico de Miranda José Manuel Siso Martínez. Recuperado de <https://dialnet.unirioja.es>
- [13] Escudero, J. M. (1987). La investigación-acción en el panorama actual de la investigación educativa: Algunas tendencias. *Revista de Innovación e Investigación Educativa*, (3), 5–39.
- [14] Gómez, A. (2010). Paradigmas, enfoques y tipos de investigación. Recuperado de <https://issuu.com>
- [15] Asghar, J. (2013). Critical Paradigm: A preamble for novice researchers. Tomado de academia.edu