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Architectural Research: Theories, Methods and Analytical Framework

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Abstract

The review examines research theories and methodologies, and analysis conceptualization of architectural research-based inquiry in architecture and built environment. It identifies a theoretical background of the architectural research such as positivist, interpretivist, and critical, as well as discusses the approaches of qualitative, quantitative, and mixed methods. The paper highlights the relevance of analytical models in organizing research issues, synthesis of theory and empirical data, as well as facilitating design-driven and performance-based research studies. The review highlights the additional importance of interdisciplinary and theoretically-driven approaches in the context of developing rigorous and effective architectural research by drawing focus on social, environmental, technological, and cultural aspects.

Keywords: Architectural Research, Research Methodologies, Critical Theory, Interpretivist Approach, Analytical Models,

1 INTRODUCTION

Architecture is not only the art of designing a building but it is a complicated science, which incorporates art, science, technology, culture, environment, and human behaviour. The research in architecture also contributes significantly to the development of knowledge in this

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multidisciplinary subject through systematic exploration of the built world, designing, and space experience and performance [1]. Architectural research has changed over time to be an intuitive and practice-based inquiry to a systematic academic study based on theories, research methods, and analytical frameworks. This development is an indication of the growing demand of evidence based designing, sustainability, social responsiveness, and technological incorporation in architecture [2], [3]. The history of the architectural research is categorically ingrained in classical architectural theory in which architects like Vitruvius were highly focused on the ideas of firmness, commodity and delight [4]. But modern architectural studies go way beyond the issue of aesthetics and construction. It deals with the topics of environmental sustainability, urbanization, climate change, social equity, cultural identity, digital technologies, and human well-being. With architecture coming in contact with social sciences, engineering, environmental studies, and humanities, architectural research has assumed varied theoretical positions and methodologies [5].

The research in architecture can be generally interpreted as a formal investigation that attempts to produce, prove, and use the knowledge that pertains to architectural design, planning and the built environment. It entails the research questions being posed, the choice of theoretically based backgrounds, use of the best methods, and use of analytical formats to analyse the results [6]. In contrast to technical research, architectural research is usually concerned with qualitative aspects of perception, experience, meaning, and cultural context as well as quantitative performance-related analyses. The workload in the field of architecture has been increasing in the last few decades and, thus, required the introduction of interdisciplinary theories and sophisticated research methodologies [7]. The development of sustainability guidelines, computer-aided modelling, simulation procedures, and participatory design has transformed the way architectural research is done. Moreover, scholarly institutions and professional organizations are paying more attention to research-based design as one of the ways to enhance the quality of design and its applicability to society [8].

Theoretical Foundations in Architectural Research

Theories are a conceptual prism in which architectural phenomena can be comprehended and interpreted. The architectural research is informed by a very broad theoretical views according to the nature and scope of research.

Classical and Modern Architectural Theories: Classical theories of architecture are centered on proportion, symmetry, order, and aesthetics. These theories have been used in the past to inform design principles and architectural education. In modern architectural theories, which are based on industrialization and functionalism, there was the focus on efficiency, rationality, and

technological progress. Concepts like Le Corbusier and Walter Gropius had emerged and focused on form after function, standardization and modern materials [9].

Phenomenological and Human-Centered Theories: Phenomenology is an important part of architectural studies that study the role of human experience and vision of space. This theoretical approach focuses on sensorial experiences, feelings, memory, and meaning of architectural landscape. The people who use phenomenological theory in their research studies are interested in how users engage with spaces and the effects of architecture to human behaviour and well-being [10].

Sociocultural and Behavioural Theories: The sociological and behavioural theories have found their way into architectural research where they are used to understand how built environments impact on social interactions. These theories look into how architecture is manifested in cultural values, social relationships, and power. Behavioural theories are widely applicable in the housing-related studies, the design of the public space, and the workplace setting in order to examine the user behaviour and the performance of the spaces [10].

Environmental and Sustainability Theories: Environmental theories in architecture are concerned with environmental harmony, energy conservation and climate sensitivity. The theory of sustainable development, bioclimatic design, and resilience are some of the concepts that guide research on green buildings and sustainable urban settings. The theories form a basis of assessment of the environmental performance and the long term effects of architectural interventions [11].

Critical and Postmodern Theories: The critical theory is a theory that questions the mainstream forms and perspectives of architecture, as well as the historical accounts and the forms of power. The postmodern theories are based on plurality, symbolism, and contextual interpretation. These theoretical approaches are regularly utilized in the history of architecture, urban studies, and design criticism [12].

Research Methods in Architectural Studies

The methods used in architectural research are quite varied, which is due to the interdisciplinary character of the sphere. They are based on the objectives of the research, scale and type of data that are needed.

Qualitative Research Methods: Qualitative approaches are popular in discussing subjective experiences, cultural meanings and design intentions. The common qualitative approaches are interviews, focus group discussion, participant observation and ethnographic studies.

The techniques are specifically useful in comprehending the perception of the users, spatial experience and involvement of the community to the architectural projects [13].

Quantitative Research Methods: Quantitative techniques entail gathering and assessment of numerical data to assess quantifiable qualities of architecture. Statistical analysis is used to analyze surveys, environmental measurements, performance testing and simulation outputs. Quantitative studies play a critical role in research involving thermal comfort, daylighting, acoustics, energy efficiency and building performance assessment [10].

Historical Research: A historical research is a type of research that uses historical materials such as papers, relics etc. to examine events or concepts of the past, the philosophy of individuals and groups at any distant time. The peculiarity of history as a mode of inquiry is that it is, perhaps, the only research strategy, whose subject of inquiry does not exist, in any empirically (observation and experience) available sense of the term. The merit of the art-architectural history study is that the artefact under consideration tends to survive in one way or another. Others research strategies commonly use history at the tactical level. It is likely that any single topic required a full-orbed account of which multiple histories of the topic are required [13].

Case Study Method: One of the most evident approaches to architectural research is the case study approach. It is the close examination of a structure, place or city in a real-life context. Case studies enable researchers to merge several data, such as drawings, photographs, documents, interviews, and observations, which give a comprehensive picture of the architectural phenomena [12].

Experimental and Simulation-Based Methods: The methods in experiments involve field, controlled experiments in laboratories, and material testing. Digital tools are applied in simulation-based methods of modeling and analyzing building performance. Computational fluid dynamics (CFD) software, daylight analysis software, and energy simulation software are used to create predictive information to aid the performance-based design decision making [14].

Mixed-Methods Approach: Mixed-methods study is a research method that combines both qualitative and quantitative research methods in order to obtain holistic results. To illustrate, statistical analysis of survey data can be supplemented by interviews to give an explanation of underlying user perceptions. This method makes the research results in architecture more valid and reliable [15].

Analytical Frameworks in Architectural Research

Analytical frameworks offer systematic ways of how to organize, interpret and synthesize research data. They assist scientists in making huge data meaningful towards conclusions.

Spatial and Morphological Analysis: Spatial analysis is used to study the architecture, structure and how spaces relate to one another. The circulation patterns, visibility, accessibility and spatial hierarchy are studied through methods of space syntax, spatial mapping and morphological analysis. The frameworks have been applied especially in the field of urban design and interior architecture research [6].

Performance-Based Analytical Frameworks: Functional, environmental and technical performance-based frameworks appraise buildings according to their functional, environmental and technical principles. Energy consumption, thermal comfort, the availability of daylight and indoor air quality are indicators that are analysed in order to determine the efficiency of buildings. These frameworks promote sustainable design and regulation [15].

Socio-Behavioral Analysis: Socio-behavioral frames examine the relationship between users and constructions. Observation, surveys and interviews data are analyzed to comprehend the trends of application, interpersonal interaction, and user satisfaction. This framework is also used in the research of housing architecture, educational architecture and healthcare architecture [10].

Comparative and Evaluative Frameworks: Comparative frameworks entail the comparison of several design options, case studies or typologies. The researchers find the best practices, limitations, and strengths by comparing various architectural solutions. The method is useful in the appraisal of sustainable buildings, vernacular architecture and urban regeneration works [2].

Integrative and Systems-Based Frameworks: Systems-based architectures perceive architecture as being a component of a bigger system comprising social, environmental, economic, and technological elements. This interdisciplinary methodology promotes long term planning and interdisciplinary research. Integrative frameworks are also being incorporated in studies of smart cities and resiliency of urban design.

2 LITERATURE REVIEW

(Fang et al., 2025) [16] The use of cutting-edge technology in architectural design, such as immersive technologies and artificial intelligence, has been crucial in boosting integration capabilities, encouraging innovation, and increasing design quality. Architects were able to produce designs that are effective, sustainable, and sensitive to modern demands thanks to these technology. In order to determine their transformational power, this research thoroughly examined the use of cutting-edge technology in creative architectural design. Four thematic dimensions—humans, the environment, technology usage, and design methods—were used to group the literature. The evaluated studies' methodology, contributions, and limitations were

examined. In order to emphasise the importance of cutting-edge technology in architectural innovation, the concept of "more-than-human design" was also highlighted. Lastly, possible technical application use cases were examined, along with important obstacles and new research directions.

(Raghani et al., 2025) [15] Investigates the application of these historical tenets to modern architectural design in order to mitigate tension, anxiety, and emotional exhaustion, emphasising the significance of integrating emotional and spiritual wellness within the constructed surroundings. Spatial psychology, architectural theory, and historical analysis were all combined in a mixed-methods approach. The investigation commenced with a comprehensive review of scholarly literature concerning sacred geometric principles and their utilisation within religious and meditative environments, subsequently conducting case studies of modern wellness facilities, meditation chambers, and spiritual retreats. The emotional effect, symbolic significance, and material sustainability of the spatial features were evaluated, and the qualitative results were interpreted using phenomenology and environmental psychology. The findings show that sacred geometry-based architectural forms, such domes, pyramids, and mandala-based layouts, improved emotional stability, spatial awareness, and meditative attention. Sacred geometry, symbolic shape, and environmental responsiveness can serve as a catalyst for spiritual connection and emotional healing, according to the study's findings. These results support a more integrated approach to design that balances psychological and spiritual well-being with functional performance, with important ramifications for public health policy, wellness infrastructure, and urban planning.

(Salura & Clarissa, 2024) [17] A case study is an in-depth, natural, holistic research technique that examines a specific, best practice, and limited occurrence. Regretfully, precedent studies occasionally just chronicle and describe architectural works as tangible things; they do not critically, thoroughly, and comprehensively analyse the choices that went into a precedent's design. The goal of this study is to filter and develop the case study technique for architectural research by offering a thorough and comprehensive knowledge of it. This study looks at and expands upon reliable, current case study literature in both social and architectural studies. The literature review's findings inform the development of an operational framework predicated on architectural function, form, and meaning. The findings of this study are expected to advance our understanding of architecture. In the end, the comprehensive information is helpful for enhancing current architectural practices and serving as a resource for the general public.

(Santos, 2024) [18] stress the value of organised architecture study that incorporates precise methodological frameworks and empirical data. The University of Porto in Portugal, the

Politecnico di Milano in Italy, and the Massachusetts Institute of Technology in the United States were chosen as case studies. Among the techniques used to gather data were document and archive consultation, individual and group discussions, and naturalistic and participatory observation. During design sessions at these three institutions between 2019 and 2022, raw field notes were taken. Photographs and documentation evidence were added to these notes after they were digitally transcribed. Using Atlas.ti and Excel, the gathered data was arranged in a database and then thematically analysed. There are two main purposes for this study. First and foremost, it seeks to add to the corpus of related research by offering a thorough description of the fieldwork approach. Second, it aims to add to the larger conversation on the importance of architectural research.

(Dorsey, 2022) [19] This article introduces an alternative theoretical paradigm for architectural design and related land utilisation methodologies rooted in pragmatism and a "spectrum of sustainability." An analysis of the difficulties and misunderstandings surrounding straw bale residential construction sheds light on the necessity of adopting a practical strategy for more reasonably priced residential development. The Living Building Challenge certification starts to assess the frequently disregarded social components and the biophilic environment, whereas the majority of building certification programs focus largely on increased energy efficiency. The urgent need to evaluate escalating housing prices is addressed by a succinct summary of the quantitative study of embodied CO₂ levels/dwelling connected with self-help affordable housing schemes. A supplementary qualitative assessment of the two existing straw bale structures in Ogden, Utah, utilising "Architectural Education Strategies (AES)" evaluates their educational benefits and shows how architecture may be moving towards pragmatism. The qualitative research emphasises how crucial it is to rescue, reuse, and recycle building materials as a practical means of lowering building expenses and CO₂ emissions. An examination of building code adoption provides additional insight into the obstacles preventing wider use of this extremely sustainable construction technique.

(Hamarat et al., 2022) [20] examine the relationships between disciplines and collected one literature review and nine empirical examples. In order to have a better understanding of the nature of architecture in relation to end-user and project team characteristics, as well as the size of the projects, we first examine these contributions in this editorial note. Second, we draw attention to four takeaways from this research and practices: We highlight how involvement in architecture (1) arises and functions in interstitial spaces; (2) is frequently used for and with "vulnerable" end-user groups; this "vulnerability" gives processes and results power and originality; (3) inspiring principles, guidelines, and frameworks are produced as outcomes; and

(4) social architectures are used beyond concrete concepts through a multilevel relationship to pedagogy. Lastly, we note that there is still a lack of clear study and integration of views on gender, politics, decolonisation, and disciplinary transfers.

(Pietrzyk, 2022) [21] The purpose of this paper is to situate research-by-design methodologies within the broader framework of inquiry systems and to highlight their potential role in addressing and resolving complex, intractable problems. It is remembered that the notion of wicked issues is pertinent to the intricate, unpredictable, and projective activities involved in architectural study. One approach that is thought to be appropriate for examining wicked situations is research by design. It has the potential to lessen epistemic ambiguity. Research-by-design methods are increasingly becoming recognised in architectural education's third cycle. The paper briefly discusses the importance of research by design technique, the research paradigm used, and the wicked characteristics of two recent PhD theses' research/design challenges. The development of academic rigour in research projects tackling complex social concerns can be aided by more deliberate delineations and elaborations of an appropriate system of inquiry and the deliberate application of research by design methodology.

(Adewale et al., 2021) [22] A society's growth and progress are universally acknowledged to be accelerated by research. It produces information that propels the economy, fosters the growth of human potential, and encourages creativity and high-calibre professional activity. The advantages of the connection between architectural practice, education, and research are abundant in the literature. In order to identify the causes of the disparity, this article looked at the nature of architectural research and practice in relation to the situation of the construction sector today. Focused group discussions with chosen architects in Ibadan were used to gather qualitative data. The findings revealed that substandard practitioner attitudes, inadequate funding, and governmental policies are among the key factors responsible for the feeble association. The article's conclusion focused on specific tactics that might enhance the two interdependent cultures' ability to work together.

(Zboinska, 2021) [23] The methodologies that use explorative design as the primary activity of knowledge generation are examined in further detail in this research. Its primary goal is to offer a critical analysis and comparative summary of the many methodological typologies in order to facilitate their further development. The study's second goal is to use these design-based techniques to create a "hybrid method" framework for architectural research. This framework encourages the concurrent use of variously constituted combinations of design-based research techniques based on insights and analyses from an author-led architectural research project. This discussion of the hybrid methodological approach aims to integrate it into the existing

framework of architectural research methodologies. This framework is frequently presented from a "mixed method" perspective, which typically segregates methodologies into either qualitative or quantitative categories. According to the study, the "hybrid method" covered here encompasses a different typology of approaches beyond this qualitative/quantitative distinction, and its application in design-based research offers significant opportunities for knowledge production and communication that should not be disregarded in the future development of architectural research methods.

(Lewis et al., 2018) [24] Examines the potential applications of innovative, interdisciplinary approaches for comprehending the process of home-making. By doing this, we create a novel methodology that blends social science techniques (such as "traditional" interviews and walk-along interviews) with architectural techniques (such as survey drawings and visual maps of both homes and common places). Finally, we explore how qualitative research may be expanded to address the material and spatial features of the house by integrating social science and architectural approaches using visual methodologies. We contend that by highlighting the unsaid aspects of physical space, embodied aspects of home, and what individuals said about their homes—all of which are crucial to home-making—our innovative cross-disciplinary approach broadens understandings of home.

3 CONCLUSION

This review is able to reach a conclusion that there is a coherent combination of theories, methods and analytical frameworks in the architectural research to fortify the research. Theoretical perspectives give a key outlook of how to explain spatial, social and environmental phenomena whereas methodological approaches allow a systematic inquiry of complicated architectural problems. Qualitative approaches will help to comprehend the human experience and culture, and quantitative methods will assist in performance evaluation, simulation, and quantifiable results. Analytical frameworks are very important in bridging theory with method, making the research process clear, consistent, and rigorous. Architectural research is increasingly becoming interdisciplinary and evidence-based due to the growing emphasis on sustainability, digital technologies, and evidence-based design. Necessary, however, in the successful use of these approaches is methodological awareness, ethical responsibility and critical reflection. In general, the high quality and relevance of architectural research as well as its applicability can be facilitated by using strong theoretical underpinnings and clearly-defined analytical frameworks to aid and improve informed decision-making and innovation in academic and professional practice.

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