

SCIENTIFIC RESEARCH PROCESS

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Excellent Publishers



The Scientific Research Process

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DEDICATION

To the cherished memory of our late father,
Alhaji Chief A.B. Harunah Bogindana,
whose values of discipline, faith, and pursuit of
knowledge continue to inspire our academic
journey.

And to all students and early-career scholars,
may this book strengthen your resolve to engage
in research that is rigorous, ethical, and impact-
ful.

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Numerous individuals and institutions have supported, encouraged, and contributed to the successful completion of this book. We are particularly grateful to the management of the University for Development Studies for providing an enabling academic environment that continually nurtures teaching, research, and scholarship. Our appreciation also extends to colleagues and fellow researchers, whose intellectual engagement and constructive feedback have inspired and refined our ideas.

We owe special gratitude to our students, whose curiosity and questions have consistently motivated us. Their desire to understand and apply research concepts meaningfully has reinforced our commitment to creating a text that is both practical and accessible. We acknowledge the invaluable contributions of our families, whose patience, encouragement, and unwavering support sustained us throughout the writing process. Their understanding provided us with the strength to persevere, even during the most demanding stages of this work. Finally, we wish to thank our readers for choosing this book. It is our hope that the ideas and guidance contained herein will serve as a reliable companion on your research journey and inspire a culture of scholarly inquiry that is rigorous, ethical, and impactful.

ABOUT THE AUTHORS

Abukari Alhassan (PhD) is an Associate Professor of Statistics at the University for Development Studies (UDS), Ghana. His expertise spans multivariate data analysis, probability, stochastic processes, and categorical data analysis, with applications in biometrics, epidemiology, agriculture, climate science and education. As founder of the UDS Laboratory for Interdisciplinary Statistical Analysis and Director of the West African Centre for Shea Innovation and Research at UDS, he has championed interdisciplinary research, learning and innovation. His extensive experience supervising student research and designing statistical frameworks reflects the methodological depth he brings to this book.

Ibrahim Alhassan (MA, MBA, MPhil, ChPA, CMC, FCILG) is Head of the Department of Human Resource Planning, Research, and Payroll Administration at UDS. With a rich background in business analytics, human resource management, and strategic planning, he combines academic research with practical administrative experience. His publications demonstrate a strong interest in linking theory with practice to improve educational and organizational outcomes.

The two authors have collaborated extensively on research that directly informs this volume. Their joint works include studies on the determinants of student achievement, the use and misuse of the Likert scale in

research, and perceptions of lecturer performance in higher education.

These studies highlight the challenges and opportunities inherent in applying research tools effectively. Building on their earlier book, *Unpacking Scholarly Inquiry*, they continue their mission to demystify research methods. This book reflects their shared commitment to equipping students and early-career scholars with practical skills to conduct research that is rigorous, ethical, and impactful.

FOREWORD

Research remains the bedrock of academic inquiry, innovation, and societal advancement. It is through systematic investigation that new knowledge emerges, theories evolve, and practical solutions are developed to confront the challenges of our time. In an era where evidence-based decision-making has become paramount across all sectors—from academia to industry, from public policy to private enterprise—the need for accessible, comprehensive, and methodologically sound guidance on research processes has never been more critical.

Scientific Research Process by Professor Abukari Alhassan and Mr. Ibrahim Alhassan makes a timely and valuable contribution to the study of research methods. Written with clarity and precision, this volume introduces readers to the essential principles, types, and processes of research while skillfully balancing theoretical foundations with practical applications. The book further emphasizes ethical considerations and the imperative of originality, thereby guiding students and researchers to conduct inquiry that is both rigorous and relevant to contemporary challenges.

The academic and professional credentials of the authors significantly enrich the substance and utility of this work. Professor Abukari Alhassan (PhD), an Associate Professor of Statistics at the University for Development Studies (UDS), Tamale, Ghana, brings formidable expertise spanning Probability, Stochastic Pro-

cesses, and Multivariate Analysis, with applications extending across biometrics, epidemiology, and education. As founder of the UDS Laboratory for Interdisciplinary Statistical Analysis and Director of the West African Centre for Shea Innovation and Research, Professor Alhassan has championed interdisciplinary learning and innovation throughout his distinguished career. His many years of supervising student research projects and designing sophisticated statistical frameworks reflect the methodological depth and pedagogical insight he brings to this volume. His extensive experience in guiding emerging scholars through the complexities of research design and analysis ensures that this book addresses the real challenges that students and early-career researchers encounter.

Mr. Ibrahim Alhassan (MA, MBA, MPhil, ChPA, CMC, FCILG), Head of the Department of Human Resource Planning, Research, and Payroll Administration at UDS, complements this theoretical expertise with a rich background in business analytics, human resource management, and strategic planning. His unique position at the intersection of academic research and practical administrative experience provides crucial insights into how research methods must adapt to real-world organizational contexts. His publications demonstrate a sustained commitment to linking theory with practice to improve educational and organizational outcomes, ensuring that this book speaks not only to academic researchers but also to industry professionals, policy analysts, and practitioners who seek to ground their work in empirical evidence.

The collaborative synergy between these two authors is evident in their extensive joint research portfolio, which directly informs this volume. Their published works include studies on the determinants of student achievement, the use and misuse of the Likert scale in research, and how lecturer performance is perceived in higher education. These investigations highlight both the challenges and opportunities inherent in applying research tools effectively across diverse contexts. Building on their earlier book, *Unpacking Scholarly Inquiry*, the authors continue their mission to demystify research methods and make sophisticated methodological approaches accessible to a broad audience.

This breadth of expertise—spanning pure statistical theory, applied research across multiple disciplines, and practical organizational implementation—positions *Scientific Research Process* as an invaluable resource for multiple audiences. The book serves undergraduate and graduate students seeking to develop foundational research competencies, academics designing and conducting scholarly investigations, industry professionals pursuing data-driven innovation, and policy analysts requiring robust evidence to inform decision-making. Whether readers are in the social sciences, natural sciences, business administration, education, health sciences, or public policy, they will find the principles and practices outlined in this volume both applicable and actionable.

With its structured presentation, the book demystifies the complexities of research and inspires confidence in

approaching inquiry as a lifelong pursuit. The authors have succeeded in creating a work that is simultaneously comprehensive and accessible, theoretically grounded and practically oriented, discipline-specific in its examples yet universal in its applications. Their shared commitment to equipping students and early-career scholars with practical skills to conduct research that is rigorous, ethical, and impactful shines through every chapter.

In a world increasingly dependent on evidence-based approaches to solve complex problems, this book provides essential guidance for all who seek to contribute meaningfully to the expansion of human knowledge. I commend the authors for this excellent work and recommend it enthusiastically to all who aspire to excel in research, regardless of their disciplinary home or career stage.

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Standing Conference of African University Libraries. Western Area

INTENDED AUDIENCE

This book is written primarily for students and early-career researchers who are beginning their journey into academic inquiry. Undergraduate and postgraduate students will find it particularly useful as it simplifies complex research concepts and provides practical guidance for developing proposals, conducting investigations, and writing reports.

It also constitutes a valuable pedagogical resource for lecturers, supervisors, and academic mentors engaged in the teaching and supervision of research. By systematically integrating sound theoretical foundations with articulated practical applications, the book provides structured guidance for lecturers teaching research methods, while also serving as an authoritative reference for supervision and academic mentoring across disciplines.

Beyond academia, the book is intended for practitioners in fields such as education, business, health, and the social sciences who wish to strengthen their research capacity. Policymakers, administrators, and professionals engaged in evidence-based decision-making can also draw insights from its discussions on methodology, ethics, and data interpretation.

While our earlier book, *Unpacking Scholarly Inquiry*, offered a broad, How-Tos, and theory-driven explora-

tion of the foundations of research, *Scientific Research Process* is designed to be more application-oriented. It places emphasis on practical steps, illustrative examples, and methodological clarity, making it an accessible companion for those who wish to translate research concepts into practice. In this way, the two volumes complement each other; one laying the conceptual groundwork, and the other providing hands-on guidance.

STRUCTURE OF THE BOOK

This book is organised into seven chapters that systematically guide readers through the entire research process. Each chapter builds upon its predecessor, integrating theoretical foundations with practical applications to equip students and researchers with the knowledge and skills necessary for rigorous scholarly inquiry.

Chapter One introduces scientific research by defining key terms, explaining the difference between basic and applied research, and looking at the main types of research, such as descriptive, exploratory, theoretical, analytical, experimental, qualitative, and quantitative approaches. The chapter guides readers through selecting research areas, formulating aims and objectives, and developing dissertation proposals. Chapter Two examines the introductory chapter of a research project, addressing three principal components: the research background, the study rationale, and the research structure, along with strategies for demonstrating originality and providing readers with a clear roadmap for the investigation. Chapter Three addresses the literature review, examining various review types (narrative, systematic, meta-analysis, scoping, integrative, and theoretical), search strategies, classification systems, theoretical frameworks, and referencing practices, including citation styles and ethical considerations.

Chapter Four provides comprehensive coverage of research methodology, exploring research philosophy (positivism, interpretivism, pragmatism, realism, constructivism), research approaches (deductive, inductive, abductive), data collection methods, sampling techniques, reliability and validity, and ethical considerations. Chapter Five focuses on data analysis, addressing quantitative techniques (correlation, regression, measures of central tendency) and qualitative methods (thematic analysis, content analysis, narrative analysis). Chapter Six addresses the presentation and discussion of findings, guiding the display of quantitative data through tables and charts, the presentation of qualitative findings using thematic frameworks and narrative summaries, and the discussion of results in relation to research objectives and existing literature. Chapter Seven concludes the research process, guiding readers in demonstrating the achievement of aims, articulating theoretical and practical contributions, acknowledging limitations, and proposing directions for future research.

Collectively, these chapters offer a coherent progression from understanding fundamental concepts to executing, analysing, and presenting research, making the book an invaluable resource for students, educators, and practitioners seeking to produce rigorous, ethical, and impactful scholarly work.

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