Preface

The constantly changing landscape of Research Methods makes it challenging for experts and practitioners to stay informed of the field’s most up-to-date research. That is why Information Science Reference is pleased to offer this three-volume reference collection that will empower students, researchers, and academicians with a strong understanding of critical issues within Research Methods by providing both broad and detailed perspectives on cutting-edge theories and developments. This reference is designed to act as a single reference source on conceptual, methodological, technical, and managerial issues, as well as provide insight into emerging trends and future opportunities within the discipline.

*Research Methods: Concepts, Methodologies, Tools and Applications* is organized into eight distinct sections that provide comprehensive coverage of important topics. The sections are: (1) Fundamental Concepts and Theories, (2) Development and Design Methodologies, (3) Tools and Technologies, (4) Utilization and Application, (5) Organizational and Social Implications, (6) Managerial Impact, (7) Critical Issues, and (8) Emerging Trends. The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, “Fundamental Concepts and Theories,” serves as a foundation for this extensive reference tool by addressing crucial theories essential to the understanding of Research Methods. Introducing the book is “Critical Parameters for Fuzzy Data Mining” by Sinchan Bhattacharya and Vishal Bhatnagar, a great foundation laying the groundwork for the basic concepts and theories that will be discussed throughout the rest of the book. Another chapter of note in Section 1 is titled “Evidence-Based Uncertainty Modeling” by Tajid Ali, which discusses an extension of the Dempster-Shafer Structure to fuzzy setting. Section 1 concludes, and leads into the following portion of the book with a nice segue chapter, “Algorithms and Methods Inspired from Nature for Solving Supply Chain and Logistics Optimization Problems: A Survey,” by Georgios Dounias and Vassilios Vassiliadis. Where Section 1 leaves off with fundamental concepts, Section 2 discusses architectures and frameworks in place for Research Methods.

Section 2, “Development and Design Methodologies,” presents in-depth coverage of the conceptual design and architecture of Research Methods, focusing on aspects including fuzzy-logic based security evaluation, fuzzy fusion, LARG index, hybrid evolutionary algorithms, discount focus subgroup method, demonic fuzzy relational calculus, and many more topics. Opening the section is “Fuzzy Logic-Based Security Evaluation of Stream Cipher” by Sattar B. Sadkhani Al Maliki and Sabihah F. Jawad. Through case studies, this section lays excellent groundwork for later sections that will get into present and future applications for Research Methods, including, of note: “Comprehensive Survey of the Hybrid Evolutionary Algorithms” by Khan Mashwani, and “Recent Advancement in Fuzzy System: Full Type 2 Fuzziness” by İ. Burhan Türksen and İbrahim Özkran. The section concludes with an excellent work by Sahib Jan, Angela Schwering, and Malumbo Chipofya, titled “Ordering: A Reliable Qualitative Information for the Alignment of Sketch and Metric Maps.”
Section 3, “Tools and Technologies,” presents extensive coverage of the various tools and technologies used in the implementation of Research Methods. Section 3 begins where Section 2 left off, though this section describes more concrete tools at place in the modeling, planning, and applications of Research Methods. The first chapter, “Practical Wisdom of Tool and Task: Meeting the Demands of the Methods with Digital Tools in Qualitatively Driven Mixed Methods Studies,” by Nancy J. Smith and Kakali Bhattacharya, lays a framework for the types of works that can be found in this section. Section 3 is full of excellent chapters like this one, including such titles as “Intelligent Questioning System Based on Fuzzy Logic,” “Interval Type-Two Fuzzy Logic for Quantitatively Defining Imprecise Linguistic Terms in Politics and Public Policy,” and “A Hybrid Technique Using PCA and Wavelets in Network Traffic Anomaly Detection” to name a few. Where Section 3 described specific tools and technologies at the disposal of practitioners, Section 4 describes successes, failures, best practices, and different applications of the tools and frameworks discussed in previous sections.

Section 4, “Utilization and Application,” describes how the broad range of Research Methods efforts has been utilized and offers insight on and important lessons for their applications and impact. Section 4 includes the widest range of topics because it describes case studies, research, methodologies, frameworks, architectures, theory, analysis, and guides for implementation. Topics range from experiences applying mixed-methods approach in information systems research to online focus groups. The first chapter in the section is titled “Experiences in Applying Mixed-Methods Approach in Information Systems Research,” which was written by Guo Chao Alex Peng and Fenio Amansingh. The breadth of topics covered in the chapter is also reflected in the diversity of its authors, from countries all over the globe. Section 4 concludes with an excellent view of a case study in technology implementation and use, “Application of Meta-Heuristic Optimization Algorithms in Electric Power Systems” by V. I. Voropai, A. Z. Gamm, A. M. Glazunova, P. V. Etingov, I. N. Kolosok, E. S. Korkina, V. G. Kurbatsky, D. N. Sidorov, V. A. Spiryaev, N. V. Tomin, R. A. Zaika, and B. Bat-Undraal.

Section 5, “Organizational and Social Implications,” includes chapters discussing the organizational and social impact of Research Methods. The section opens with “Triangulation in Organizational Research: Validating Knowledge in Human Competence at Work” by Ben Tran. Where Section 4 focused on the broad, many applications of Research Methods technology, Section 5 focuses exclusively on how these technologies affect human lives, either through the way they interact with each other, or through how they affect behavioral/workplace situations. Other interesting chapters of note in Section 5 include “A Second Life in Qualitative Research: Creating Transformative Experiences” by Kakali Bhattacharya, and “Archetypal Personalized Recommender System for Mobile Phone Users” by B. A. Ojokoh, M. O. Omisore, O. W. Samuel, and U. I. Eno. Section 5 concludes with a fascinating study of a new development in Research Methods, in “Integration between Mathematical Programming and Fuzzy Logic to Optimize Consumers Behavior.”

Section 6, “Managerial Impact,” presents focused coverage of Research Methods as it relates to effective uses of complex fuzzy-system dynamics, parameter tuning, comparative analysis, and many more utilities. This section serves as a vital resource for developers who want to utilize the latest research to bolster the capabilities and functionalities of their processes. The section begins with “Fuzzy System Dynamics: An Application to Supply Chain Management.” The 7 chapters in this section offer unmistakable value to managers looking to implement new strategies that work at larger bureaucratic levels. The section concludes with “Intelligent Computation for Manufacturing” by Ashraf Afify. Where Section 6 leaves off, Section 7 picks up with a focus on some of the more content-theoretical material of this compendium.
Section 7, “Critical Issues,” presents coverage of academic and research perspectives on Research Methods tools and applications. The section begins with “QoE Prediction for Multimedia Services: Comparing Fuzzy and Logic Network Approaches,” by Natalia Kushik, Jeevan Pokhrel, Nina Yevtushenko, Ana Cavalli, and Wissam Mallouli. Other issues covered in detail in Section 7 include online PSO-based fuzzy logic tuning approach, computer-aided deductive critical discourse analysis, uncertainty modeling, and much more. The section concludes with “Comparative Study on Multi-Objective Genetic Algorithms for Seismic Response Controls of Structures” by Young-Jin Cha and Yeesock Kim, a great transitional chapter between Sections 7 and 8 because it examines an important question going into the future of the field. The last chapter manages to show a theoretical look into future and potential technologies, a topic covered in more detail in Section 8.

Section 8, “Emerging Trends,” highlights areas for future research within the field of Research Methods, opening with “Comparison of Linguistic Summaries and Fuzzy Functional Dependencies Related to Data Mining” by Miroslav Hudec, Milijan Vućetić, and Mirko Vujošević. Section 8 contains chapters that look at what might happen in the coming years that can extend the already staggering amount of applications for Research Methods. Other chapters of note include “Intelligent Bandwidth Allocation of IPTV Streams with Bitstream Complexity Measures” and “New Trends in Fuzzy Clustering.” The final chapter of the book looks at an emerging field within Research Methods, in the excellent contribution, “Power Electronics and Controls in Solar Photovoltaic Systems” by Radian Belu.

Although the primary organization of the contents in this multi-volume work is based on its eight sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume.

As a comprehensive collection of research on the latest findings related to using technology to providing various services, Research Methods: Concepts, Methodologies, Tools and Applications provides researchers, administrators, and all audiences with a complete understanding of the development of applications and concepts in Research Methods. Given the vast number of issues concerning usage, failure, success, policies, strategies, and applications of Research Methods in countries around the world, Research Methods: Concepts, Methodologies, Tools and Applications addresses the demand for a resource that encompasses the most pertinent research in technologies being employed to globally bolster the knowledge and applications of Research Methods.