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Untapped Knowledge in India's E-Waste Industry A Roadmap to Strengthen the Informal Economy

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ISSN 2662-3862 ISSN 2662-3870 (electronic)
Palgrave Advances in the Economics of Innovation and Technology
ISBN 978-3-031-50295-8 ISBN 978-3-031-50296-5 (eBook)
<https://doi.org/10.1007/978-3-031-50296-5>

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Cover illustration: © John Rawsterne/patternhead.com

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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PREFACE

This book is a synthesis of the core elements of my 780-page long PhD thesis: “Understanding E-Waste Reverse Supply Chain and Formalization of Informal E-Waste Processors: A Qualitative Case Study,” which I completed in Production and Operations Management area at the Indian Institute of Management (IIM) Bangalore.

My doctoral research journey spanned more than eight years. It was partly funded by the Ph.D. fellowship from IIM Bangalore and partly funded by my wife. The research included 2 years of intense ethnographic fieldwork during which I interviewed more than 90 industry experts. I call my methodology *ethnographic* because it centers on developing a deep understanding of people and context by *immersing* in the industry.

When I began this research, my goal was to incentivize informal e-waste recyclers to become formal. I was thinking of how to make them comply with the prevailing e-waste law. But my ethnographic fieldwork led me in the opposite direction, and I began to question the foundational assumptions of formalization.

I believe my research and this book represents operations management scholarship as defined by Kostas Dervitsiotis in his classic textbook *Operations Management*, published in 1981:

It is the study of a field where knowledge from the social sciences (economics, psychology, sociology), engineering, and mathematics comes together to create and operate productive systems for the satisfaction of human needs in products and services.

While researching India's e-waste recycling industry, I realized that I knew very little about India's informal economy and how local industries work. I also realized how politics, history, culture, and society influence how the industry functions. To understand and synthesize what I saw in the field, I expanded my research beyond my home discipline of operations management and wove in learnings from economic history, sociology, development studies, archaeology, anthropology, environmental politics, critical geography, and other fields. This multidisciplinary approach led me to a more holistic understanding of India's e-waste recycling industry.

It took me five years to reframe and rewrite my specialized PhD thesis into the book you are currently reading. This book is written in an accessible manner to reach a wider audience of scholars and practitioners of waste management and sustainable development. The book is best understood if it is read sequentially from Chapters 1 to 5 and reflecting on these chapters as a whole.

I hope this book sparks the reader's interest in three ways:

- Encourage future operations management scholars to do ethnographic fieldwork and multidisciplinary research on *messy* topics and ask *big questions* to advance scholarship.
- Influence public discussions of India's e-waste policy by challenging the dominant bias toward Extended Producer Responsibility.
- Provide pathways to develop contextual solutions to manage e-waste in the Global South and foster a thriving circular economy across industries.

Birmingham, UK

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ACKNOWLEDGMENTS

This book is dedicated to the 90+ experts from the e-waste recycling industry who shared their time and knowledge with me. They did this purely for goodwill, without expecting anything in return. I owe them a debt of gratitude. To protect their confidentiality, I am not calling out the names of these experts.

I am grateful to Pooja, my wife, for being the breadwinner and funding my doctoral research for more than three years. She also supported me when I took a six-month break from work to write this book full-time.

I thank Meera Seth and Bronwyn Geyer, commissioning editors at Palgrave Macmillan, for handling the entire process swiftly. Meera Seth was kind enough to grant me multiple extensions to meet deadlines that helped balance my family and professional commitments.

I thank the two anonymous reviewers for their constructive feedback that helped to improve this manuscript.

I thank the late N. S. Ramaswamy, founder director of IIM Bangalore, for encouraging me to pursue research on India's waste management industry.

I am grateful to Barbara Harriss-White, professor at the University of Oxford, for taking the time to listen to my research and encouraging me to pursue public scholarship. It was exciting to dream with Barbara about a multidisciplinary waste institution affiliated with a prestigious university.

Many colleagues and faculty have helped me during my Ph.D. journey and this book publication. I would like to call out specific individuals who went beyond the call of their duty by providing encouragement, moral support, compassion, and a job during the final and sometimes challenging stages of my Ph.D. research: Rajiv Kozhikode, Krishna Sundar, Nayana Tara, Rejie George, Ganesh Prabhu, Shooj Bhaskaran, Papi Reddy, Srikanth Krishnaprasad, Parvathy B, Ganesh Kumar, Damini Gupta, Jai Ganesh, Amol Agrawal, Althaf Shajahan, Srinidhi Raghavendra, and Shubham Singh.

Special thanks to my friendly colleagues at Mphasis NEXT Labs for their kindness and guidance as I rejoined into the corporate world and expanded my knowledge of bleeding-edge technologies.

Erica Machulak helped me to think through and structure my complex 780-page thesis, transitions between the components of my key findings, and how best to leverage my field evidence. This high-level framing to connect the dots helped me clarify what I wanted to get across in this book. I wish Erica was a member of my doctoral advisory committee. Simangele Mabena supported my writing process, and this helped to move my book forward by writing in small increments and celebrate wins, large and small.

PRAISE FOR *UNTAPPED KNOWLEDGE IN INDIA'S E-WASTE INDUSTRY*

“Krishnan’s research makes a compelling case for designing e-waste policies in collaboration with informal processors by recognizing and valuing their system. A similar case can, and should, be made for the informal economy in general, not just in the e-waste sector or in India. This is an important and timely book!”

—Martha Alter Chen, *International Coordinator, WIEGO; Lecturer in Urban Planning and Design at the Graduate School of Design, Harvard University*

“For decades policy that ignores its own necessary preconditions has generated unintended side effects, as demonstrated by the thunderclaps of demonetisation, GST, labour and farm law reforms. So recent high-stakes policies for the formalisation of India’s huge informal economy have become contentious. Krishnan’s study of e-waste, its informal recycling and circular reprocessing - and of new policy to formalise it - provides granular evidence of unintended policy effects and of the paradoxical waste of the very human and material resources that the policy seeks to develop. A must-read for wastistas and for policy scholars and practitioners.”

—Barbara Harriss-White, *Professor Emeritus of Development Studies, Emeritus Fellow of Wolfson College, and Senior Research Fellow, School of Interdisciplinary Area Studies, University of Oxford*

“Most of India’s e-waste is recycled by the so-called informal processors, a highly functional network of specialists, who handle e-waste as small family businesses. India’s current e-waste law based on Extended Producer Responsibility (EPR), favours formal processors, and creates barriers for informal processing. Its implementation has led to chaotic and economically inefficient scenarios. Krishnan’s research argues for restructuring the EPR-based law to account for the ground reality. More generally, it raises questions about both the informal (and occasionally unsafe), and the formal (and often bureaucratic), approaches to waste management in the Global South, where a large fraction of the world’s waste may have to be processed in the coming decades.”

—Nitin Joglekar, *Associate Professor of Operations and Technology Management, Boston University and Departmental Editor, Production and Operations Management*

“This is a groundbreaking book that challenges conventional thinking and sheds light on the untapped potential within India’s electronic waste industry. Krishnan’s meticulous research and insightful analysis reveal how the informal sector, which has been thriving for centuries, embodies the principles of a circular economy. This work not only exposes the flaws in formalization policies but also makes a compelling case for leveraging the strengths of informal processors to drive economic and environmental gains. It is a must-read for those interested in sustainable development and e-waste management in India and other emerging economies. Additionally, the book would be a valuable resource for doctoral-level methods courses, serving as an excellent example of immersive field research.”

—Rajiv Kozhikode, *Associate Professor for International Business and Management & Organization Studies, Beedie School of Business, Simon Fraser University*

“Informal sector e-waste processing in India is shrouded by secrecy due to the many illegalities involved. It is in this difficult and complex context that Krishnan has conducted a rare and intensive field study to learn how the informal sector has created knowledge to become effective and efficient while the formal sector is plagued by losses. Highly recommended for policy makers, managers, and researchers.”

—Ganesh N. Prabhu, *Professor of Strategy, Indian Institute of Management Bangalore*