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Strategies for Sustainable Technologies and Innovations



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Edward Elgar

Cheltenham, UK • Northampton, MA, USA

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Published by
Edward Elgar Publishing Limited
The Lypiatts
15 Lansdown Road
Cheltenham
Glos GL50 2JA
UK

Edward Elgar Publishing, Inc.
William Pratt House
9 Dewey Court
Northampton
Massachusetts 01060
USA

A catalogue record for this book
is available from the British Library

Library of Congress Control Number: 2012951764

This book is available electronically in the ElgarOnline.com
Business Subject Collection, E-ISBN 978 1 78100 683 2



ISBN 978 1 78100 682 5

Typeset by Servis Filmsetting Ltd, Stockport, Cheshire
Printed by MPG PRINTGROUP, UK

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Sascha Bioly, after his high school degree (Abitur), served as a Telecommunications Officer in the German army. After that he worked as a systems administrator in information technology (IT). Trained as an industrial clerk, in 2005 he joined Dresdner Cetelem Bank in Duisburg,

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Sanjeeb Kakoty was born and lives in the charming hill city of Shillong, India. His quest to understand the past is confined not merely to knowing what happened, but also how and why things happened. This led to a post-graduate degree in History from North Eastern Hill University, Shillong followed by a PhD in the History of Technology. He believes that proper understanding of the past should give mankind the ability to engineer desirable change instead of merely trying to adapt to change. To that end, he has worked as a teacher, writer and a documentary film maker and is currently a faculty member of the Indian Institute of Management, Shillong, teaching sustainability and communications.

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Acknowledgements

The organizers of the research conference, and the editors and authors of this research volume, have amassed some not insignificant debts of gratitude to a number of individuals, colleagues and organizations whom they wish to acknowledge. This volume is mainly a direct offshoot of the November 4, 5 and 6, 2009 international conference titled 'Multinational Enterprise and Sustainable Development: Strategies for Sustainable Technologies and Innovation' (MESD 2009), held at the Palais des Congrès de Nancy, France. We wish to acknowledge the support of The Coca-Cola Entreprise, France; the PRME (Principles for Responsible Management Education); the ICN Business School and its administration; the Centre Européen de Recherche en Economie Financière et Gestion des Entreprises (CEREFIGE), of Université de Lorraine, France which mobilized its extensive regional research network; and the CIBER Centers program through its Georgia Tech Center for International Business Education and Research. We express our grateful thanks to the United Nations PRME, Atlanta, Xerox France, Schneider Electric, Rhodia, La Fibre Verte, abcvvert, Inderscience publishers, ENSIC, MGIMO, Georgia Tech-Lorraine, the Lorraine Region, Communauté Grand Nancy, the Conseil Général de Meurthe et Moselle and finally to Metz Métropole for their guidance and support in organizing the original event.

All of the authors included in this volume have worked long and hard in preparing their chapters and 26 reviewers were involved in two rounds of chapter selection and revision. We wish to single out keynote speaker Paul Shrivastava, David O'Brien Distinguished Professor of Sustainable Enterprise, and Director, David O'Brien Center for Sustainable Enterprise, John Molson School of Business, Concordia University; Mr Tomoo Machiba, past Senior Policy Analyst (Project Manager, Sustainable Manufacturing & Eco-innovation), Structural Policy Division (SPD) – OECD Directorate for Science, Technology and Industry (DSTI); Prof. John C. Crittenden, Director of Georgia Tech's Brook Byers Institute for Sustainable Systems, Georgia Institute of Technology; Prof. Corinne Gendron, Chairholder and Professor, Chaire de responsabilité sociale et de développement durable, ESG-UQÀM, Montreal, Canada; Prof. Tagi Sagafi-nejad, The Radcliffe Killam Distinguished

Professor of International Business, Director, Center for the Study of Western Hemispheric Trade and Director, International Trade Institute. Many thanks go also to Michael Matlosz, Director of ENSIC-INPL; Patrick Mazeau, Manager Customer Led Innovation, Xerox Innovation Group; Christian Wiest, International Operating Division, Executive Vice President, Schneider Electric; and Arnaud Rolland, head of the Coca-Cola Enterprises' sustainable unit, who were most helpful in their personal support and guidance.

A special word of thanks to Georgia Tech-Lorraine, the European campus extension of the Georgia Institute of Technology, in Metz, France which organized a reception for the participants of the original November 2009 event.

Introduction: Foundational considerations in balancing innovatory processes and sustainable development practices in comparative light

John R. McIntyre, Silvester Ivanaj and Vera Ivanaj

This book of expert and scholarly contributions on strategies for sustainable technologies and innovations is the by-product of the three-day international conference (Multinational Enterprises and Sustainable Development – MESD'09) held at Nancy, France, in November 2009, jointly organized by the ICN Business School (France), the CEREFIGE research center of the Université de Lorraine (France), and the Georgia Tech Center for International Business Education and Research, Georgia Institute of Technology, Atlanta, USA.

The conference brought together academics, research-oriented practitioners, experts, consultants and various professionals in the field of technology management for sustainable development with a view to refine our understanding of one of the major challenges of our environmental future: its innovation dimensions. Our conviction is that the form in which business operations are actually conducted around the world cannot be sustained, as momentous changes continue to characterize our planet. Scientific evidence points to the fact that human and organizational behaviors can result in critical damage to our natural systems. The quality of human existence continues to be strongly related to our ability to innovate and to conceive sustainable technological and productive systems. Radical socio-technical changes are needed to slow and eventually reverse the deterioration of our environment, but also to develop available natural resources. Business firms are catalysts and agents of societal and economic change. Over the last decade, companies have faced social and environmental pressures to better integrate the challenges of sustainability. Scholars, policy-makers and experts, among others, have argued that sustainable development is the perfect opportunity for businesses to strengthen the evolving notion of corporate social responsibility,

while achieving long-term growth through the innovatory process and capitalizing on research and development. Companies that ignore these opportunities do so at their peril. But companies have had considerable difficulties in addressing the opportunities inherent in the challenge of sustainable development. In particular, their technological and innovation strategies are often inappropriate to manage the complex and the uncertain nature of this new demand. Corporate strategies that integrate the goals of sustainability are urgently needed.

Given the ever-changing global economic environment and the challenges raised by the legal process, strategic choices for technology and innovation have become key factors for success in implementing sustainable development policies. The economic growth and competitiveness as well as the societal well-being of businesses can be predicated on these choices and policies.

This book focuses on the issue of strategies for innovation-driven sustainable technologies. It seeks to address the following major questions regarding sustainable development: Why, when, and how will such strategic technological and innovatory choices be made and deployed? Can enterprises make technological choices that will be economically advantageous, ecologically sustainable and socially responsible? How do corporations balance and harmonize their choices, considering the elements of technological innovation, economic growth, resource efficiency and environmental protection? Do contextual, economic, ecological or societal factors play a role in economic and financial profitability, competitiveness, market openness, policies, technical standards and regulations? Are there international differences that bear noting and have some explanatory power? Are current decisions an adequate response to anticipated future needs? What is the relationship between technological strategies employed by businesses and a country's or a sector's economic performance? How do enterprises employ strategic analysis in order to compare the negative impacts of present-day technologies with the positive benefits of future innovations?

These questions are at the core of sustainable strategic management and apply to management scholars, economists, lawyers, sociologists and individuals in all the relevant engineering fields. It must be reiterated that while multinational corporations have been at the forefront of sustainable development, the role of small and medium-sized enterprises cannot be undermined as they respond to the broad trends set in motion by larger firms. Nor can the ethical dimension of such choices, strategies and modes of implementation be ignored as they frame the debate. Technology sets the production frontier, and should be viewed as a neutral factor, often resulting from the political stakes of public and private decision-makers.

Our book seeks to provide guidance to enterprises of all sizes and to organizational decision-makers seeking sustainable technology and innovation-driven solutions. The purpose of the authors and of the entire volume is to explore and share ways in which business firms can bring their technology and innovation strategies in closer alignment with the requirement of sustainability.

The book is structured in two parts, each of which deals with a specific aspect of sustainable technology and innovation systems: 'Part I: Building sustainable technology and innovation systems', and 'Part II: Strategic implications and assessment'.

PART I: BUILDING SUSTAINABLE TECHNOLOGY AND INNOVATION SYSTEMS

The six chapters in Part I address the relationship between sustainable technology and innovation in the context of global socio-economic systems. The core idea is that sustainable technologies and innovations must benefit both companies and global economic and social development. Innovation can be a value-creating process and can integrate social needs more fully through a radical, or at least momentous, cultural change by empowering both customers and employees. This process of innovation has evolved a transformation in which multinational corporations of necessity will play a central role responsive to a more globalized regulatory system. Moreover, life philosophy, beliefs and values of the world community will also shape sustainable technologies and innovation systems.

In Chapter 1, Paul Shrivastava examines how sustainable innovation constitutes a useful response to global climate change. Climate change is rooted in human activities, many of which are directly controlled by corporations. Sustainable innovations can assist companies in improving their ecological and social performance and gaining competitive advantage. He shows that a mindful application of appropriate technologies and rational use of resource conservation by companies can yield large gains in performance. This, he claims, can happen with respect to a company's vision, inputs, throughputs and outputs. Past literature associates technological innovations with 'high-tech', and large research and development (R&D) budgets. Shrivastava asserts that this is not necessarily the case. Sustainable innovations can take simple rationalization approaches, de-bureaucratizing organizational procedures and conserving renewable resources sensibly. He provides several examples of sustainable innovations in main-line companies such as General Electric, Walmart, 3M Corp, United Parcel Service of America Inc., and others. Sustainable

innovations can also be facilitated by empowering customers and employees to eliminate wasteful practices in areas where small benefits can be magnified by frequency of use.

In Chapter 2, 'Understanding eco-innovation for enabling a green industry transformation', Tomoo Machiba elaborates a theoretical framework of eco-innovation by taking stock of the extant knowledge, and proposes a fresh perspective for more comprehensive analyses in the future. The chapter first outlines a context of green growth and eco-innovation in the past two decades since sustainable development emerged as a global policy discourse. Green growth can be considered as a new strategy to revive the sustainability agenda and to integrate it practically into mainstream policies as well as industry activities.

Green growth generally entails decoupling economic growth from environmental degradation. However, in many areas, environmental pressures continue to rise as economies grow, and improvements in efficiency have often been offset by increasing consumption and outsourcing. The challenges cannot be met by business as usual. In this chapter, eco-innovation (or sustainable innovation) is given as a key factor to enable the decoupling. Diverse types of eco-innovation exist including both the creation of new technologies, products and processes, as well as their application and diffusion. Synthesizing the existing understanding and definitions, the author proposes to analyze eco-innovation based on a three-dimensional framework that consists of an innovation's target, mechanism and impact.

An examination of corporate sustainable production activities through this proposed framework indicates that the primary focus of current eco-innovation tends to rely on technological advances, typically with products or processes as eco-innovation targets and with modification or redesign as principal mechanisms. Nevertheless, a number of complementary organizational or institutional changes have functioned as key drivers for these developments, such as the setting up of intersectoral or multi-stakeholder collaborative networks. The author argues that a sophisticated combination of different types of innovation could bring far-reaching changes in the techno-social system and enable a long-term green transformation by impacting several components of the economy including consumers.

Among the key social, technical and political elements in determining the success of eco-innovation, particular attention is paid to the 'business model', which drives eco-innovation to the market and enables its diffusion. The business model perspective allows a deeper and more subtle understanding of how environmental value is captured, turned into profitable products and services, and can deliver convenience and satisfaction to users. It is particularly relevant to radical and systemic eco-innovation as