Strategies for Sustainability

Series Editor

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The series focuses on "implementation strategies and responses" to sustainability problems – at the organizational, local, national, and global levels.

Our objective is to encourage policy proposals and prescriptive thinking on topics such as: sustainability management, sustainability strategies, lifestyle changes, regional approaches, organisational changes for sustainability, educational approaches, pollution prevention, clean technologies, multilateral treaty-making, sustainability guidelines and standards, sustainability assessment and reporting, the role of scientific analysis in decision-making, implementation of public-private partnerships for resource management, regulatory enforcement, and approaches to meeting inter-generational obligations regarding the management of common resources.

We favour trans-disciplinary perspectives and analyses grounded in careful, comparative studies of practice, demonstrations, or policy reforms. This largely excludes further documentation of problems, and prescriptive pieces that are not grounded in practice, or sustainability studies. Philosophically, we prefer an open-minded pragmatism – "show us what works and why" – rather than a bias toward a theory of the liberal state (i.e. "command-and-control") or a theory of markets. We invite contributions that are innovative, creative, and go beyond the 'business as usual' approaches.

We invite Authors to submit manuscripts that:

- Document and analyse what has and has not worked in practice;
- Develop implementation strategies and examine the effectiveness of specific sustainability strategies;
- Propose what should be tried next to promote greater sustainability in natural resource management, energy production, housing design and development, industrial reorganization, infrastructure planning, land use, business strategy, and organisational changes;
- Prescribe how to do better at incorporating concerns about sustainability into organisations, private action, and public policy;
- Focus on trans-disciplinary analyses grounded in careful, comparative studies of practice or policy reform; and
- Provide an approach "…to meeting the needs of the present without compromising the ability of future generations to meet their own needs," and do this in a way that balances the goal of economic development with due consideration for environmental protection, social progress, and individual rights.

Themes covered in the series are:

Sustainability management
Sustainability strategies
Lifestyle changes
Regional approaches
Organisational changes for sustainability
Educational approaches
Pollution prevention
Clean technologies
Multilateral treaty-making
Sustainability guidelines and standards
Sustainability assessment and reporting
The role of scientific analysis in decision-making
Implementation of public-private partnerships for resource management
Governance and regulatory enforcement
Approaches to meeting inter-generational obligations regarding the management of common resources

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Industrial Symbiosis for the Circular Economy

Operational Experiences, Best Practices and Obstacles to a Collaborative Business Approach

Springer

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Foreword

This book will bring you lessons from practices and tested assessment methods drawn from the field of industrial ecology (IE) and industrial symbiosis (IS). These experiences are essential for the renewed attention for creating new uses for rest products and recycled materials, which has been renamed as 'circular economy' in the last 5–10 years.

For me, one of the inspirations to start working in the field of environmental sciences and sustainability in the 1980s was the work of a Dutch civil society organisation called 'de Kleine Aarde' (the Small Earth) in the late 1970s/early 1980s on what they called the 'kringloop samenleving' (the circulation society), promoting short recycling loops and small-scale production with practical action and examples, like the compost toilet, providing manure for your own garden. Showing many other examples of what citizens and small local social enterprises could do (including building and isolating houses with recycled materials from consumers and agriculture—one of the examples in this book) were an inspiration for many. Later, as an academic researcher in this field, I discovered that many comparable grass-root movements around the world had been doing this as well. In the same early days, on the global level, the Club of Rome reached a worldwide audience with their warnings for resources' depletion which would lead to societal disruption. Also, in those days the first missions to the Moon made astronauts and their audiences realise that we only have one planet, called Earth, to be carefully treated by and for us all, as voiced by Boulding in 1966 in his 'Economics for Spaceship Earth'.

Connecting these memories makes one thing clear to me: critical thinking has a long lifespan, we see these three early visions each strengthening over time, they are refurbished into various new forms, and continue to be an inspiration for many people around the world. A lot has happened since these early manifestations of what we now call 'circular economy' (CE). In a recent article, I framed this history with my colleagues as moving from CE 1.0, via CE 2.0 to CE 3.0. This book connects CE 2.0 with CE 3.0. While the main challenge of CE 1.0 was to still create the first infrastructures, legislations and real-life practices of collecting material streams from consumers and producers to enable recycling in the 1970s and 1980s,

the 1990s became the period of more intensive take-up in the business world, where industries together with academic scholars like Tibbs, Graedel and Ehrenfield started to use lessons from ecosystems in creating exchange networks of material flows: that is when 'industrial ecology' and 'industrial symbiosis' were born: industrial frontrunners and environmentalists had found each other, and also developed first eco-design methods, created eco-industrial parks as inspired by the Kalundborg example, and introduced mimicry and many more approaches. They had one advantage compared to the 'early warners': by then first national and supranational regulations (like at EU level) had been developed and implemented, be it with different speeds around our single planet. It was a period of optimism, the key vocabulary in this period included words like 'win-win' and 'PPP', meaning 'pollution prevention pays', which did work so partly because in the front-running countries' pollution and landfilling had been made far more expensive. Some current new believers of the contemporary CE may be unaware of or have forgotten about these early histories, which are also shortly described in Chap. 1. Waste management, pollution and recycling policies were at least in some countries creating first evidence of decoupling economic (traditional) GDP growth and environmental degradation. However, at same time our single planet has been facing continuous growth of population and the wealth of an increasing part of this population, in short implying that the progress in reducing the environmental impacts is not fast enough if we zoom out for evidence from the level of companies, value chains, products and consumers to the level of our single planet Earth. The framing of sustainable development as a twin agenda of integral ecological and societal fairness, which has been embraced by the United Nations since 1992, adds additional challenges to the agenda. It has been argued that the former manifestations of the three critical thinking visions, like IE and IS, were too much focussing on the environmental dimension alone, ignoring the social challenge of fair distribution of wealth. The CE 2.0 bias towards ecology and economy (as discussed in Chap. 1) is understandable if we see how they emerged. We should value and appreciate that the business world and environmental entrepreneurs found each other. But the challenges and their complexity have increased faster than our speed of creating eco-efficiency solutions. In addition, sustainable development calls for integrating the social challenges of achieving a fair, equitable development for all, in a world of expanding value chains and shifting of the environmental and social burdens of our (here I am choosing a biased position) western consumption to low-income countries.

This book aims to link the experiences of the CE 2.0 approaches to the current CE 3.0 agenda. This is a timely and essential choice: we need to understand what works, and also why solutions that did not (yet) work, did not do so. The International Sustainable Development Research Society (ISDRS) has been addressing these critical questions as the academic platform since 1995 for studying, discussing and exchanging knowledge, suggesting ways forward for the three visions above in our annual conferences, with special tracks on recycling, industrial ecology and the more. This book brings together useful cases of experiences with implementing recycling in regional, collaborative contexts, in various parts of the

world, including Italy, Poland, Colombia, Africa and Mexico, which were presented and discussed during the 24th ISDRS conference in Messina, Italy, in June 2018. The examples show that these visions do find their way in various efforts to adapt production practices in ways that will deal with the persistent challenges of sustainable development in diverse forms, labelled with concepts like 'Transition Regions Towards Industrial Symbiosis' (TRIS), 'MoSCoW', 'Sustainable Enterprise Network methodology' (RedES) and 'Smart Sustainable Districts', and show the diversity of possible routes towards a circular economy.

The editors state in their first chapter that IS and IE were maybe not as successful as the current high uptake of CE might suggest and assume that the label (circular) 'economy' is simply more attractive in industrial circles, than the older label of (industrial) 'ecology'. Looking at the dazzling high numbers of publications on CE, one should also be aware that the total academic output is growing with comparable speed due to changes in academic culture and growth. For comparing the 1990's IE with the 2010's CE, one should divide such annual figures by the total annual number of academic journals: I remember the same vibe about IE in those days. One thing changed for sure in the last 20 years: while in the early days mainstream business and politics could still argue that there was still abundant time, stating that resource depletion can still be mitigated by innovation and new discoveries, this argument cannot be maintained nowadays. Even though some populist politicians still do so, one cannot ignore anymore that the challenges are growing, CE now has a strong message as we arrived in an era where we cannot postpone anymore, the signals of resource depletion, pollution causing extensive biodiversity loss and climate disruption are not anymore future scenarios in reports in paper, but they have become visible in the daily news. The sense of urgency has raised to a boiling temperature. In planning for the transition towards circular economy as an essential element of the wider sustainable development agenda, the experiences discussed in this book will bring you essential lessons.

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