Book Review

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Emerging Technologies: Value Creation for Sustainable Development
by: Sinan Küfeoğlu
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The United Nations General Assembly adopted the '2030 Agenda for Sustainable Development' in 2015 (United Nations, 2015). This agenda is a road map for achieving 17 Sustainable Development Goals (SDGs) with 169 specific targets aimed at stimulating actions to solve global concerns in various critical areas. These include poverty and hunger, gender inequality and social justice, infrastructure and energy deficiencies, education needs, and economic growth demands, as well as the effects of climate change and environmental pollution, among others. In short, the new agenda, which significantly expands the eight millennium development goals (MDGs) of 2000 (United Nations, 2000) now covers three dimensions of sustainable development: economic, social, and environmental (United Nations, 2024). Achieving the SDGs is not legally binding, but it is expected that governments will work towards them, ideally in partnership with the global community.

The book by Sinan Küfeoğlu explores numerous new approaches and technologies for achieving the 17 SDGs. He uses a case study approach to collect information from over 600 innovative companies in more than 50 countries. Küfeoğlu holds several academic degrees, including a DSc and MSc in Electrical Engineering. His research interests include energy economics and futures, technology policies, and sustainable development. The book contains 20 chapters, of which the first two chapters serve as an introduction to the topic and the last chapter contains concluding remarks in the form of a summary. The remaining chapters (Chapters 3–19) describe 34 emerging technologies and explore how they can be applied to the SDGs. Some of the new technologies are assigned to more than one SDG.

In Chapter 1, Küfeoğlu discusses the concepts of innovation and value creation. He points out that innovation starts with ideas that can translate into new methods and products, new markets, and even new organisational structures. Furthermore, innovation can lead to social changes, policy developments, new business models, and government involvement, to name a few. The process of innovation is thus complex and can affect all parts of society. Küfeoğlu emphasises the importance of carefully assessing the social,

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economic, and environmental impacts of innovations to ensure that any kind of innovation creates value, which means, benefits people and society.

In Chapter 2, Küfeoğlu starts out by defining the term 'emerging technologies'. He sees them as technologies "whose development and application areas are still expanding fast, and their technical and value potential is still largely unrealised" (p.41). He then introduces the 34 technologies (see Table 1), which he assigns to the SDGs in the following 17 chapters.

Table 1 Thirty-four emerging technologies to support sustainable development

3D Printing	5G Network Technology	Advanced Materials	Artificial Intelligence	Autonomous Vehicles	Big Data
Biometrics	Bioplastics	Biotechnology and Bio-manufacturing	Blockchain	Carbon Capture and Storage	Cellular Agriculture
Cloud Computing	Crowdfunding	Cybersecurity	Data Hubs	Digital Twins	Distributed Computing
Drones	Edge Computing	Energy Storage	Flexible Electronics and Wearables	Healthcare Analytics	Hydrogen
Internet of Behaviours	Internet of Things	Natural Language Processing	Quantum Computing	Recycling	Robotic Process Automation
Robotics	Soilless Farming	Spatial Computing	Wireless Power Transfer		

Küfeoğlu describes, for example, a 3D printing technology to manufacture filters. Unlike other manufacturing processes, this innovation provides faster and cheaper solutions to make water drinkable. Another emerging technology is the SaWa bag, which can hold up to 4 l of water. When exposed to the sun for 4 hours, the ultraviolet (UV) rays kill microorganisms in the water and make it thus safe for drinking. Both innovations are described for SDG-6 'Clean Water and Sanitation'. Other examples include the development of a liquid metal battery system and a bio-enzymatic fuel cell that can be used in energy production and storage. Furthermore, the incorporation of customised AI-based software and machine learning services are considered useful for optimising energy delivery. All these innovations create value and can be applied towards achieving SDG-7 'Affordable and Clean Energy'. Other innovations are related to SDG-12: 'Responsible Consumption and Production'. Here, a material recycling approach using robotic devices, which are enhanced by computer vision and deep-learning can support the identification and separation of recyclables from mixed materials. Moreover, using lightweight bamboo fibres instead of fossil fuel materials is considered an emerging technology to be useful in the production process of composite materials. Finally, the use of digital twins (i.e., virtual replicas) to follow the flow of materials through various manufacturing processes are considered an important innovation.

All examples described above are only small snippets of the many technologies and applications Küfeoğlu discusses in this book. Thus, a major strength of this publication is the detailed description of 34 new technologies, starting with value proposals and followed by value creation and value capture. Information about the innovative

companies is also provided. I believe an additional benefit for readers is the presentation of a case study for "Eligibility and Procedures for Grant Approval" (p.7). This study illustrates several steps required in the application process for proposed new technologies. Furthermore, almost all chapters contain a list of references cited in the text. These references can be used for further reading.

I was surprised to read that the book contains seven *Forewords*, which is unusual. I assume that the importance of the topic, the diversity and wide range of the emerging technologies, as well as the nexus between science-business-policy-society are the reasons why people from different fields and countries contributed to this section of the book. There is no doubt that innovation and value creation for sustainable development requires a multi- and interdisciplinary approach and includes reaching out for advice and collaboration around the globe.

I consider the lack of a glossary of terms used in this book a weakness. Although the description of the 34 technologies in the main text is excellent, a glossary would have made it easier to navigate the book. An index for keyword searches is provided. Readers of the e-book have the added benefit of using the 'Find Text' search function to quickly access information of special interest.

There are several books on the market that describe certain aspects of emerging technologies and/or focus on sustainable development. To the best of my knowledge, Küfeoğlu's book contains by far the most comprehensive compilation of information about 'green' companies and the value they create through emerging technologies in support of *all* 17 SDGs. This makes this book unique and a valuable contribution to the literature on environmental innovation and sustainable development. I believe it is well suited as a learning tool for university students and researchers, especially for scientists and engineers. It can also serve as a reference guide for industry leaders, product managers, and policymakers, as well as an important information source for representatives of governments and non-governmental organisations. I have no hesitation recommending this book.

Conflicts of interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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