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Section 1
Conceptual and Theoretical Bio-Economy Framework or Reference

This section presents four chapters addressing some relevant issues focusing on concepts and theories of the bio-economy paradigm. The four chapters conceptually explore some different trajectories and contestations of this paradigm, arguing more broadly that this is becoming a significant driver for re-structuring corporate and competitive strategies and policies between firms, markets, and urban and rural spatial development between and within places.

Chapter 1
Bio-Economy: Visions, Strategies, and Policies 1
Baseem Khan, Hawassa University, Ethiopia

As the world's economy is transforming from conventional to sustainable mode, bio-economy will play an important role in this transition. The development of sustainable bio-economy is the great challenge in different parts of the world. For this purpose, adequate visions, strategies, and policies are required. Therefore, this chapter deals with the adequate visions, key strategies, and important policies for the development of sustainable bio-economy. Some case studies also presented where these visions, policies, and strategies are already implemented.

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Strategies of Sustainable Bioeconomy in the Industry 4.0 Framework for Inclusive and Social Prosperity 21
Erhan İşcan, Cukurova University, Turkey

The last two decades have witnessed unpredictable transformations in knowledge-related areas. The main reason for this change is the fourth industrial revolution, a knowledge revolution affecting fields like the bioeconomy. The third industrial revolution, which induced the use of fossil-based energy sources, created a major

global problem. Likewise, the third industrial revolution introduced the problem of the excess usage of food, animals, water, and other resources. Industry 4.0 offers an efficient solution to excessive tendencies. This chapter aims to analyze changes and offer strategies in the bioeconomy framework within Industry 4.0.

Chapter 3

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Magdalena Grochulska-Salak, Warsaw University of Technology, Poland

Urban farming is defined as building development for the production of plants for the needs of the local community. The presented issues concern the shaping of urban farms for the preservation of the environmental balance of urban spaces and connections concerning the coexistence of architecture and greenery in the city. This chapter indicates the possibility of shaping synergistic spatial systems by integrating urban space and buildings with an innovative production function—a municipal farm—that complements the functional structure of the city in connection with the shaping of public spaces and the greenery system. The pro-environmental architecture connected with technologies enabling the production of plants in buildings enables the integration of urban space, complementing the functional and spatial structure of the city. The implementation of new technologies enables the production of plants in hydroponic and aeroponic farm buildings. The urban farm is an element in planning the city's sustainable development.

Chapter 4

Parametric Evaluation of Beam Deflection on Piezoelectric Material Using Implicit and Explicit Method Simulations: A Study in Energy Engineering 65
Rakesh Nath, Girijananda Chowdhury Institute of Management and Technology, India

Energy harnessing methods from rainwater using various smart materials have come into research, thus widening the scope of using these materials for the implementation in modern use. The piezoelectric materials present a brief idea of voltage generation whenever the material is deflected. The purpose of the study is to visualize an interconnection in parametric analysis of piezoelectric effect based energy harvester using two different commercially available piezoelectric materials, PZT-4A and PZT-5H, through series of implicit and explicit method simulations of FEM on COMSOL and ANSYS. The dynamic loads of different rainwater droplets sizes are investigated analytically. To calculate the variation of different methods in terms of deflection and voltage output, the implicit and multi-body explicit dynamic simulations are implemented separately.

Section 2
Issues Related to Investment in Different Industry Sectors

There is increasing consensus about nature providing a wide range of benefits to people and the importance of incorporating these ecosystem services into resource investment and management decisions of different industry sectors centered on sustainable and ecological development. This section explores the developments, achievements, and possibilities of specific cases related to the bioenergy sector (biodiesel companies in Mexico) and the bio-education for community development.

Chapter 5
Entrepreneurial and Institutional Analysis of Biodiesel Companies in Mexico 89
José G. Vargas-Hernández, University of Guadalajara, Mexico
Juan José Esparza López, University of Guadalajara, Mexico
Justyna Anna Zdunek-Wielgołaska, Warsaw University of Technology, Poland

The objective of the chapter is to analyze the role of the institutions in the biodiesel industry, in order to know if there is a relationship with the quality and maturity of the same with the ventures. Starting from a literary review, the framework of the current situation is identified, covering aspects related to formal institutions, laws, rules, regulatory bodies, and the theory that supports the relationship between institutions and entrepreneurship. The chapter concludes that the institutions in Mexico have increased their maturity and incentive to increase the number of producers and distributors of biodiesel, thus taking advantage of the growing market.

Section 3
Specific Cases on Sustainable City Development

Bio economy has a high importance for generating environmental, ecological, and socio-economic impacts, especially in populated urban areas and peripheries. This last section presents four chapters related to the topic of sustainable city planning and development. Each chapter explores and analyzes a specific city: Warsaw, Guadalajara, Chinese Villages in Guanzhong, and Tokyo.

Chapter 6
Ecological Centre of Warsaw as a Development Path 117
Krystyna Gruszecka, Warsaw University of Technology, Poland

The purpose of this chapter is to present a new development path towards greening the city center of Warsaw in the context of the increasing density of building development in recent years. After the process of urban sprawl, there has been a tendency to concentrate buildings, especially in the city center. Currently, a new idea and the

need to improve the climate in the city is being born. The aim is to convert dispersed green areas into a continuous network of corridors and green spaces, comprising the city center on both sides of the Vistula River. The future structure of green areas in the central part of Warsaw will be built as an element of bioeconomy. According to this new pattern of urban greenery, larger green enclaves will be connected by corridors created out of necessity along densely built-up streets. Such elements as green walls, green roofs with decorative greenery and food crops, pocket greenery, as well as urban farms (e.g., algae energy generation) will complement buildings, foster healthy environment, and create the opportunity to enjoy pastimes.

Chapter 7
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Roberto Jiménez, Universidad de Guadalajara, Mexico
Paula Lourdes Guerrero Rodríguez, Universidad De Guadalajara, Mexico
Rogelio Rivera Fernández, Universidad De Guadalajara, Mexico

The analysis of some systems of green areas and public parks of the metropolitan area of Guadalajara, other cities of our country Mexico and Latin America, shows common problems such as the deficit of urban green spaces, insecurity, unemployment, and uncertainty with a social exclusion in these areas of stress. Likewise, the lack of economic value of the services provided by such natural systems as recreation is added. Together they are important factors in the allocation of territories destined to this use with respect to others that generate Urban speculation. Therefore, it is proposed to develop a typology of green areas appropriate to the needs of the metropolitan region. It will facilitate the production of inventories that estimate indicators of territorial cohesion, governance, economic profitability, social, environmental quality and innovation, as well as incorporating new technologies that improve geographic information systems and internet media that support management.

Chapter 8
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Yuan Zhong Cai, Xi'an University of Architecture and Technology, China
Feng Wu, Xi'an University of Architecture and Technology, China
Jing Li, Xi'an Polytechnic University, China
Jin Wang, Xi'an University of Architecture and Technology, China
Mei Huang, Xi'an University of Architecture and Technology, China

Driven by the state strategy of rural revitalization, Chinese rural areas receive unprecedented opportunities for development. However, China's Guanzhong region faces numerous problems in its rural planning research, such as 1) lack of terrain

maps of most villages, 2) satellite maps collected from open platforms are inaccurate and fail to support a more detailed spatial analysis, 3) data and information are 2-dimensional, 4) data collection is inefficient. And, most villages consist of several village groups that are usually 400~500 m apart. Areas of Guanzhong are located on the plain, with low architectural height and an excellent environment of net clearance. In addition, there are no large-scale factors, mineral areas, and industrial facilities, which means low interference from the magnetic field. Compared with urban regions, such rural areas have a better work environment for UAV and better conditions of collecting needed data.

Chapter 9
Developing a Sustainable Eco-City in Pre-Olympic Tokyo: Potential of New Methods and Their Limits in an Urban Era 196
Mariko Ikeda, University of Tsukuba, Japan

This chapter intends to elucidate the emergence of sustainable urban development in Tokyo in light of the upcoming 2020 Olympics by exploring various administrative and commercial practices, such as urban development plan with rooftop and wall greening or river projects in the inner city. The research methods involved a review of the empirical literature, an analysis of existing statistical data, and a detailed examination of case-specific data collected in a field survey. This chapter concludes that since Tokyo Metropolitan Government encourages urban greening projects as a solution of urban heat island from 2000s, utilization of "green spaces" in the landscape design of commercial and office facilities is gaining attention. This chapter concludes that various practices for sustainable urban development in Tokyo, which faces a restructuring process in light of the 2020 Summer Olympics, exist and that some of these could be further developed by the private sector.

Chapter 10
Forest-River-Ocean Nexus-Based Education for Community Development: Aiming at Resilient Sustainable Society 224
Shimon Mizutani, Tokyo University of Marine Science and Technology, Japan
Kai Liao, Tokyo University of Marine Science and Technology, Japan
Tsuyoshi Goto Sasaki, Tokyo University of Marine Science and Technology, Japan

Bioeconomic research aims at developing a more resource-efficient and sustainable society that uses renewable biological resources to produce food, materials, and energy. Economic supremacy causes many problems, such as global warming, depletion of fossil fuels and natural resources, and loss of biodiversity. In order to build a more sustainable society with resource efficiency, it is necessary to discuss the institutional framework, which includes environmental assessment, environmental

monitoring, biological resource management, human resources management, and education. This chapter examined the effectiveness of forest-river-ocean nexus-based education for community development (FRONE) in encouraging the sustainable use of biological resources. Combined with the adaptive cycle, FRONE is considered to have the potential to promote the sustainable use of biological resources. In the future, further bioeconomic research from the point of view of the education system will be needed.

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