

Book review: "Knowledge-Driven Developments in the Bioeconomy: Technological and Economic Perspectives"

An international research network led by the University of Hohenheim sheds light on the concept of the knowledge-based bioeconomy from a number of different perspectives. The transformation of our fossil-based economic system – the current status quo – into a biobased, sustainable production system involves many complex challenges. Global interconnectedness means that such challenges are not restricted to individual countries or regions. Innovation and intensive research are essential if the bioeconomy concept is to be implemented.

Six universities from Germany, Brazil, Mexico, Canada and Denmark that all play a leading role in the bioeconomy field have joined forces to form the "Bio-based Economy (BECY)" strategic network led by the University of Hohenheim. Its aim is to advance research and international cooperation in the field¹. Together with other experts, the network has now published a book that presents current research results and gives recommendations for action.

The book opens with an article by Prof. Dr. med. Andreas Pyka, economist and professor in the Department of Innovation Economics at the University of Hohenheim. He explains why approaches in neoclassical economics are only of limited use when it comes to transforming the current economic system into a bioeconomy, and instead calls for neo-Schumpeterian economic concepts. These concepts focus on qualitative aspects and long-term change in fundamental economic structures rather than on purely quantitative, short-term economic growth.

Long-term change is precisely what is needed to establish a bioeconomy. According to Pyka, purely technical innovations are not enough to successfully convert the current economic system into a biobased production system. Political and socioeconomic factors play a significant role as well and tend to be the decisive impetus for change. One example Pyka gives is the emergence of the so-called "sharing economy", in which consumers share goods instead of buying them individually. He shows how industry in turn is responding to this social trend with more sustainable product design, and so-called planned obsolescence is becoming less important. He is of the opinion that this will create new digital platforms and business sectors (e.g. in the field of repairs and maintenance). Furthermore, Pyka considers that political actors not only have a duty to regulate economic developments, but also to consciously control them. For example, this could involve creating incentives for a cooperative economic system that promotes knowledge transfer between businesses and consumers as well as networks and related synergies.

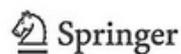
In his contribution entitled "Structural Change, Knowledge and the Bioeconomy", Dr. Pier Paolo

Economic Complexity and Evolution

Stephan Dabbert
Iris Lewandowski
Jochen Weiss
Andreas Pyka *Editors*

Knowledge-Driven Developments in the Bioeconomy

Technological and Economic Perspectives



Cover of book entitled "Knowledge-Driven Developments in the Bioeconomy: Technological and Economic Perspectives"
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Saviotti from Utrecht University in the Netherlands takes a look into the future. He describes what structural changes are to be expected in the transition to a bioeconomy at both the national and geopolitical levels. Saviotti assumes that certain fossil-based industries will disappear while new (e.g. in the field of molecular biology) industries will emerge. He also anticipates that in contrast to petrol- and coal producers, biomass producers will benefit from the change - a structural change that can potentially lead to geopolitical conflict. Saviotti also notes that the concept of the bioeconomy dates back to the period before the industrial revolution when it actually represented the status quo. He believes that our economic system will continue to go back to bioeconomic principles throughout the whole 21st century, even under the most favorable conditions.

The reason for this is ably described by Hugo de Vries from the University of Montpellier. He speaks of the bioeconomy paradox in reference to the complex task of linking economic growth with social and environmental concerns. In his article "Some Thoughts about the Bioeconomy as an Intelligently Navigated Complex Adaptive System", he presents a model that is

expected to help researchers understand the complexity of the problem and derive concrete instructions for innovation research.

Based on these general theoretical considerations in the first half of the book, the second half presents individual countries or regions and their specific situations in terms of the bioeconomy. The first two articles provide an overview of regional and national differences in the EU and Central America, and four contributions cover Brazil, Tasmania, Malaysia and Denmark.

The third chapter of the book is more specific still. It addresses the provision of biomass for a biobased economy. The book's co-editor, Prof. Dr. Iris Lewandowski (University of Hohenheim) opens the chapter with a discussion on whether and how global biomass production can be sustainably adapted to increasing demand in the context of the bioeconomy. The contributions that follow present three crops that play a key role in the bioeconomy: sugar cane, eucalyptus and maize. Sugar cane and eucalyptus are predominantly used for energy production (biofuel, energy) in Brazil, and maize is used to produce biobased plastics in Canada.

The final chapter deals with the implementation of the theoretical approaches and turning them into innovative value chains and technologies. The current state of research is presented, followed by concrete instructions for managing biobased value chains. A case study from Costa Rica shows how regional biomass (in this case, cow dung) can be used to produce economically and ecologically sustainable energy and organic fertilisers.

"Knowledge-Driven Developments in the Bioeconomy: Technological and Economic Perspectives" does what it sets out to do, focusing on the concept of the bioeconomy from different perspectives over 300 pages. It takes into account all the aspects of the bioeconomy, discussing theoretical and conceptual visions of the bioeconomy from an economic standpoint, the importance of political and socioeconomic conditions in different countries and regions, as well as specific, technical issues relating to the sustainable provision of biomass and finally it presents some examples of current application of the bioeconomy. The book thus takes a holistic approach, something that is central to the concept of a bioeconomy², making it a must-read for experts and newcomers in the bioeconomy field.

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Further information

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