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Metabolism of society: Why we should understand our supply chain networks.



ABSTRACT

Supply chains are literally producing everything for everybody, involving and coordinating all 8 billion people on earth. Supply chains are network structures that evolve at tremendous rates, leading to emergent phenomena such as innovativeness, robustness, and resilience. Understanding the dynamics of supply chain networks poses a significant challenge. We show how to use large data sets to produce digital twins of the economy that enable us to identify weak spots of economies, identify systemic risks, and allow us to show how such models become policy relevant. We discuss risks of not knowing supply chain networks at the European level in times of growing tension.

SHORT BIO

Stefan Thurner is a co-founder and the president of the Complexity Science Hub. With an academic background in physics and economics, he studies the principles and foundations of complex adaptive systems. His work focuses on the dynamics of networks and their applications in medicine, financial and supply chain economics, systemic risks, as well as in social opinion dynamics and healthcare.

Stefan Thurner began his academic career with contributions to theoretical particle physics before shifting his research focus toward complex adaptive systems. He has published more than 300 scientific articles covering fundamental physics (topological excitations in quantum field theories, statistics and entropy of complex systems), applied mathematics (wavelet statistics, fractal harmonic analysis, anomalous diffusion), network theory, co-evolutionary systems, life sciences (network medicine, gene regulatory networks, bioinformatics, heartbeat dynamics, cell motility), economics and finance (supply chain dynamics, price formation, regulation, systemic risk), and in social sciences (collective human behavior, opinion formation, bureaucratic inefficiency, and resilience of healthcare systems).

His work has been covered extensively in over 1,000 newspaper, radio and television reports by media such as The New York Times, BBC World, Die Zeit, NZZ, Arte, Nature, New Scientist and Physics World. In 2017, he was elected Austrian Scientist of the Year and received the "Paul Watzlawick Ring of Honor" in 2021.

He earned a PhD in theoretical physics from the TU Wien and a PhD in economics from the University of Vienna. He held postdoctoral positions at the Humboldt University Berlin and Boston University. His habilitation is in theoretical physics.

Since 2009, he has held the chair of Science of Complex Systems at the Medical University of Vienna and is an external professor at the Santa Fe Institute in New Mexico.