

The economic interdependence of industries: a network science approach

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This study focuses on the interdependence of different industries and wishes to examine how sectors support each other in growth. It contributes to the research into economic inter-industry relations by suggesting a new approach to analyse input-output models from a network science perspective.

Given the increasing complexity of our society, we cannot examine a problem without the help of interdisciplinary approaches. Inter-industry relations are profoundly interdisciplinary; therefore, we must use techniques that view industries from a systematic perspective and understand the complexity of relations. In this study, we use network science tools to explore industry interrelatedness through the help of input-output analysis. Leontief's economic input-output models represent, in mathematical form, the monetary transactions between industry sectors. They specify what goods and services (output) are consumed by other industries (input).

No industry can exist and develop individually. All sectors are interdependent through the exchange of products and services. Our research argues that we must analyse detail-level input-output models with a high number of sub-sectors to understand the most accurate structure of the network of industries. We develop and explore the detail-level network of 405 sectors by concluding where the industry inter-dependence network goes through a 'scale-free – random' topology shift. Besides this, the study answers the question of whether there are any 'super industries' in our society that are required everywhere and how many resources they pump into the cycle of industry development. The research is also interested in the bigger picture: whether the field of sectors is symmetric, and do the industries need the same amount of resources as they give as support?

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