

Glossary

- Constraint** An equation or inequality that defines a limitation on the range of values that can be assumed by the variables of an optimization model
- Enterprise input-output model** A small-scale input-output model whose flows and coefficients are deduced from firm- or enterprise-level data
- Environmentally extended input-output model** An input-output model augmented with additional equations or inequalities to signify the flows of natural resources drawn from, as well as pollutants discharged into, the environment
- Feasible region** The region defined by the constraints of a mathematical program which contains all possible values of the system variable
- Final demand** The net output of a sector in an input-output system that is used for final consumption (i.e., not used as an input for production elsewhere)
- Fuzzy optimization model** An optimization model whose feasible region is a fuzzy set
- Fuzzy set** A mathematical set with ill-defined boundaries, such that its elements can assume partial membership
- Global optimum** A solution of a mathematical program which contains the best possible value of the objective function, as well as the associated values of the variables that lead to this solution
- Gross domestic product** The total value of the final demand or net output of an economic system, often used as a measure of the size of the system
- Industrial complex** A network of industrial plants that are linked via a supply chain and are geographically clustered
- Infrastructure system** A network of basic facilities that provide essential support for activities in society

- Inoperability** A dimensionless measure of risk in infrastructure systems, whose value ranges from 0 at normal state to 1 at a state of total failure
- Inoperability input-output model** An input-output model that describes the flow of inoperability risk within an infrastructure, process, or economic network
- Input-output model** A linear system of equations and/or inequalities that describes a network of interdependent processes, sectors, or activities
- Intermediate demand** Demand for goods within an economic system, by other sectors that require the goods as production inputs
- Leontief inverse** The inverse of the difference between an identity matrix and the technical coefficient matrix of an input-output system, which when multiplied by the final demand vector yields the total output vector
- Linear program** A class of mathematical programming models whose objective function and constraints are comprised entirely of zero- and first-order polynomial terms, and whose variables are all continuous
- Life cycle assessment** A systematic methodology for the analysis of the environmental impacts of product systems that takes into account cradle-to-grave effects
- Local optimum** A solution to a mathematical program but which does not necessarily give the best of all possible value of the objective function, but which is superior to solutions in its immediate vicinity
- Mathematical program** A model consisting of one or more objective functions and a set of constraints that define feasible values of system variables; also known as an *optimization model*
- Mixed-integer linear program** A class of mathematical programming models whose objective function and constraints are comprised entirely of zero- and first-order polynomial terms, and which contains both continuous and integer variables
- Objective function** A measure of the performance of a system, expressed as an algebraic function of system variables, which is to be minimized or maximized in an optimization model
- Organizational input-output model** An input-output model of interactions among groups of staff or personnel, with transactions being measured in person-hours rather than economic value
- Perturbation** An initial shock or disruption to an input-output system, usually as a result of an external triggering event
- Physical input-output model** An input-output model whose flowrates and coefficients are given in physical rather than economic terms

- Polygeneration** The coproduction of electricity with other energy and material outputs within a single, highly efficient facility
- Regional input-output model** An input-output model which represents a geographically defined subset of a larger economic input-output system
- Resilience** The capability of a system to recover to its normal state after being subjected to a disruption
- Scale invariance** A condition that assumes a fixed value for technical coefficients for components of an input-output model, regardless of scale or size
- Supply chain** A network of linked processes or plants that comprise a sequence of steps in the generation of a product
- Sustainability** The ability of a system to operate indefinitely while considering economic, social, and environmental aspects
- Technical coefficient** A parameter that indicates the ratio of production input per unit of output in a component of an input-output system also known as *technical coefficient*
- Total output** Total level of production by an economic sector in an input-output system, which is sufficient to cover both intermediate and final demand

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