Water and Global Value Chain: A subsystem application to Brazil

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The deindustrialization of developed countries has led to a shift in water use activities to developing countries without a similar reduction in consumption of manufactured goods in developed countries. The location of different stages of production in other countries with the objective of reducing costs (including environmental ones) has led to an increase in international trade regarding final goods and, in particular, intermediate inputs.

The objective of this paper is to analyse the use of water by production and consumption in Brazil from 1995 to 2009, using a multiregional input-output matrix in order to consider all water uses (blue, green and grey water) associated to value chains. Estimates were made using the World Input-Output Database (WIOD).

The methodology of the subsystems or vertically integrated sectors is used to quantify the total (direct and indirect) use of the different types of water by the Brazilian sectors and subsystems from 1995 to 2009, including the uses avoided/caused by the final and intermediate imports/exports. Next, structural decomposition analysis is applied to investigate the role of international trade in the evolution of total water use and the extent to which the change in composition of domestic production by industry (and the consequent change in water use) is due to changes in production and in consumption. In conclusion, it is shown how comparison between the use of the different types of water by sector and corresponding subsystem provides can be useful for evaluating the impacts of public policies on production and consumption in the management of water resources.

As far as our knowledge, this is the first application of subsystem analysis of water use avoided/caused by the production, consumption, and final and intermediate imports/exports and the first structural decomposition analysis to be undertaken with economic and environmental data from Brazil.